



Afghanistan

Opium Survey 2006



data collection

data transfer

data transfer

October 2006

ABBREVIATIONS

ANP Force	Afghan National Police	CPEF	Central Poppy Eradication
GPS Monitoring Programme	Global Positioning System	ICMP	UNODC Illicit Crop
MCN	Ministry of Counter Narcotics	MoI	Ministry of Interior
RAS and Crime	UNODC Research and Analysis Section	UNODC	United Nations Office on Drugs

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This report, and other ICMP survey reports can be downloaded from:

www.unodc.org/unodc/en/crop_monitoring.html

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PREFACE

This is the full report of the opium survey of Afghanistan that the United Nations *Office on Drugs and Crime* made public in September 2006. There was considerable alarm when it was announced that opium cultivation in Afghanistan rose to 165,000 hectares in 2006, a 59% increase over 2005. This 6,100 tons of opium gives Afghanistan the dubious distinction of having nearly a monopoly of the world heroin market.

Major traffickers, warlords and insurgents are reaping the profits of this bumper crop to spread instability, infiltrate public institutions, and enrich themselves. Afghanistan is moving from narco-economy to narco-state.

While criminals prosper, the rest of society suffers. In Afghanistan, opium is choking development and democratization. The rule of the bullet and the bribe exists where there is no rule of law.

In countries neighbouring Afghanistan, there is a serious risk of a worsening HIV/AIDS epidemic spreading through intravenous heroin injection. Downstream, in traditional Western European markets, health officials should brace for a rise in the number of deaths from drug overdoses as this year's bumper opium crop will lead to higher-purity doses of heroin. I have written to health officials and mayors, warning them of the dangers. More should be done – particularly in rich countries – to improve drug prevention and treatment.

I suspect that in years to come this opium survey will be regarded as a key document in mapping the fate of Afghanistan. Either it will demonstrate the peak of Afghanistan's opium problem, or the tipping point at which the country descended into chaos. In the months ahead we must redouble our efforts to ensure that it is the former and not the latter.



Antonio Maria Costa
Executive Director
UNODC

FACT SHEET - AFGHANISTAN OPIUM SURVEY 2006

	2005	Difference on 2005	2006
Net opium poppy cultivation	104,000 ha	59%	165,000 ha
In percent of agricultural land	2.30%		3.65%
In percent of global cultivation	62%		82%
Number of provinces affected	26		28
Eradication	5,000 ha	210%	15,300 ha
Weighted average opium yield	39.3 kg/ha	-6%	37.0 kg/ha
Potential production of opium	4,100 mt	49%	6,100 mt
In percent of global production	87%		92%
Number of households involved in opium cultivation	309,000	45%	448,000
Number of persons involved in opium cultivation	2.0 million		2.9 million
In percent of total population (23 million)	8.70%		12.60%
Average farm gate price of fresh opium at harvest time	US\$ 102/kg	-8%	US\$ 94/kg
Average farm gate price of dry opium at harvest time	US\$ 138/kg	-9%	US\$ 125/kg
Afghanistan GDP ¹	US\$ 5.2 billion	29%	US\$ 6.7 billion
Total farm gate value of opium production	US\$ 0.56 billion	36%	US\$ 0.76 billion
in percent of GDP	11%		11%
Total export value of opium to neighbouring countries	US\$ 2.7 billion	15%	US\$ 3.1 billion
In percent of GDP	52%		46%
Gross trafficking profits to Afghan traffickers	US\$ 2.14 billion	9%	US\$ 2.34 billion
Household average yearly gross income from opium of opium growing families	US\$ 1,800	-5%	US\$ 1,700
Per capita gross income of opium growing farmers	US\$ 280	-7%	US\$ 260
Afghanistan's GDP per capita	US\$226	28%	US\$ 290
Indicative gross income from opium per ha	US\$ 5,400	-15%	US\$ 4,600
Indicative gross income from wheat per ha	US\$ 550	-4%	US\$ 530

¹ Source : Afghan Government, Central Statistics Office, preliminary estimate

EXECUTIVE SUMMARY

Afghanistan opium poppy cultivation increases to a record level of 165,000 hectares

The area under opium poppy cultivation in Afghanistan increased by 59% from 104,000 hectares in 2005 to 165,000 hectares in 2006. This increase is in line with the findings of the Rapid Assessment Survey implemented in January-February 2006 (UNODC, *Afghanistan Opium Rapid Assessment Report*, February 2006).

As a result of the upsurge in opium poppy cultivation in Afghanistan in 2006, global opium poppy cultivation rose by some 33% in 2006 to 201,900 hectares. The share of Afghanistan increased from 62% in 2005 to 82% in 2006.

Table 1: Afghanistan opium poppy cultivation, 1994-2006 (hectares)

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
71,000	54,000	57,000	58,000	64,000	91,000	82,000	8,000	74,000	80,000	131,000	104,000	165,000

Figure 1: Opium poppy cultivation from 1986 to 2006 (hectares)

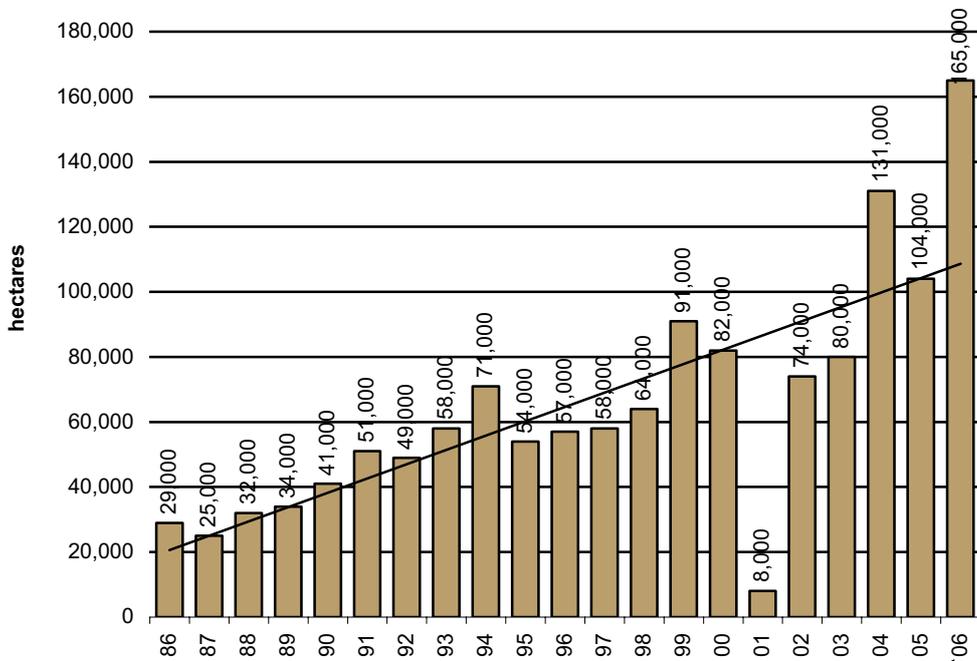
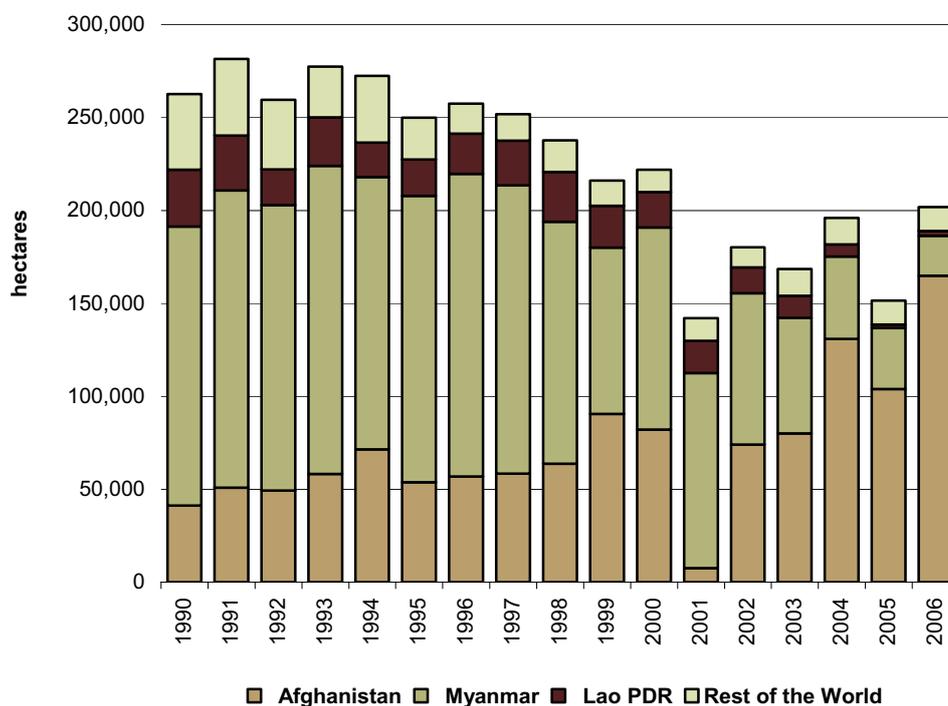


Figure 2: Global opium poppy cultivation (ha), 1990-2006

In 2006, opium poppy cultivation in Afghanistan increased by more than 10% in 14 provinces, while it remained stable (less than 10% up or down) in 12 -mostly eastern and central- provinces. Decreases were found in 8 provinces, mainly located in northern Afghanistan. The survey did not find any opium cultivation in Paktika, Paktia, Wardak, Logar, Panjshir and Ghazni provinces.

Opium poppy cultivation in the Southern Region increased by 55,753 ha (121%), which accounts for the main part of the total increase in opium poppy cultivation in 2006 (61,000 hectares). It was reported that, due to the security problems in the Southern Region, so-called Anti Government Elements (AGE) were able to encourage and even threaten farmers to cultivate opium poppy. As a result, opium poppy cultivation in 2006 in the Southern Region (101,900 ha) is almost equal to the total opium poppy cultivation in Afghanistan in 2005 (104,000 ha). At present, a large part of the Southern Region is closed to UN missions. In addition, most of the NGOs providing services in this region had to leave. Eradication campaigns carried out by the Government were not effective in this region due to the security problems, except in Kandahar province.

Most of the opium poppy cultivation in the south takes place in Helmand. This province alone accounts for 42% (69,324 ha) of the total opium poppy cultivation in Afghanistan in 2006. The current opium poppy cultivation level in Helmand is higher than the cultivation levels for the entire country in 1986-1993, 1995-1997 and 2001.

Large increases in absolute terms took place in Uruzgan, Badakshan, Day Kundi and Nangarhar (7,679 ha, 5686 ha, 4463 ha, and 3,779 ha respectively). The biggest reductions were found in Balkh and Farah (-3,605 ha and -2,546 ha respectively).

Table 2: Main opium poppy cultivation provinces in Afghanistan (hectares), 2006

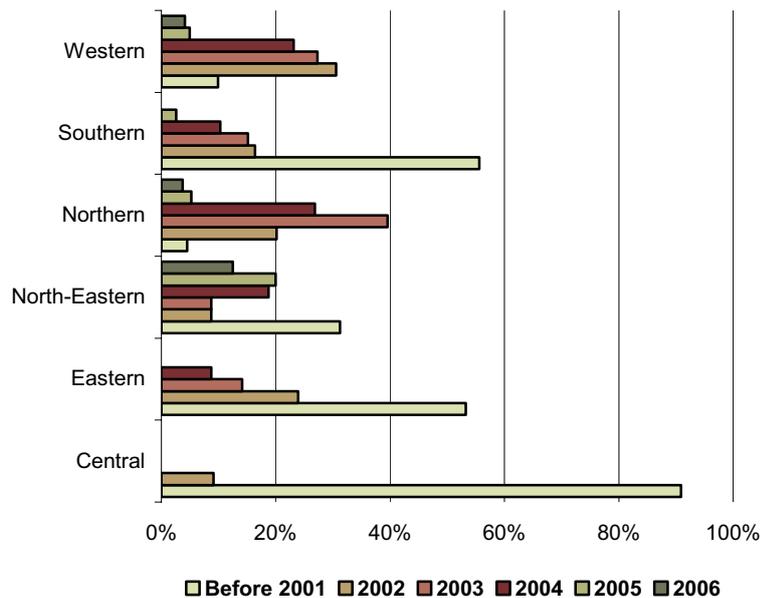
Province	2003	2004	2005	2006	Change 2005-2006	% Total in 2006	Cumulative %
Hilmand	15,371	29,353	26,500	69,324	162%	42%	42%
Badakhshan	12,756	15,607	7,370	13,056	77%	8%	50%
Kandahar	3,055	4,959	12,989	12,619	-3%	8%	58%
Uruzgan	4,698	N/A	2,024	9,773	383%	6%	63%
Farah	1,700	2,288	10,240	7,694	-25%	5%	68%
Balkh	1,108	2,495	10,837	7,100	-34%	4%	72%
Day Kundi	2,445	N/A	2,581	7,044	173%	4%	77%
Rest of the Country	38,867		31,459	38,390	22%	23%	100%
Rounded Total	80,000	131,000	104,000	165,000	59%		

12.6% of the total population is involved in opium poppy cultivation

In 2006, the survey estimated that 448,000 families were involved in opium poppy cultivation, compared with 309,000 families in 2005. This is an increase of 45%. Given an average of 6-7 members per family, 448,000 families represent an estimated total of about 2.9 million persons or 12.6% of Afghanistan’s 23 million total population.

The increase of 45% opium cultivating households in 2006, does not mean that these are all ‘new’ opium poppy growing farmers. About 37% of the opium poppy growing farmers in Afghanistan started to cultivate poppy before the year 2001, 63% of them started after the year 2001. A few farmers started opium poppy cultivation in 2005 (5%) and in 2006 (3%). In 2006, only farmers in North-Eastern, Northern and Western Region of Afghanistan farmers cultivated for the first time. In Southern Afghanistan, where opium poppy cultivation increased by 62% in 2006, none of the farmers cultivated for the first time. Both in the Southern and Eastern Region, around 50% of the farmers started opium poppy cultivation before the year 2001.

Figure 3: Starting year of opium poppy cultivation by region (n=754)



Potential opium production in Afghanistan peaks at 6,100 metric tons in 2006

The potential opium production was estimated at around 6,100 metric tons, representing an increase of about 49% compared to 2005. This is the highest production level ever recorded in Afghanistan. As a consequence, global opium production has also reached its highest point since 1990, at 6,629 metric tons. The proportion of Afghanistan in global opium production increased from 87% in 2005 to 92% in 2006.

Table 3: Afghanistan potential opium production (metric tons), 1994-2006

1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
3,400	2,300	2,200	2,800	2,700	4,600	3,300	185	3,400	3,600	4,200	4,100	6,100

Figure 4: Potential opium production in Afghanistan (metric tons), 1980-2006

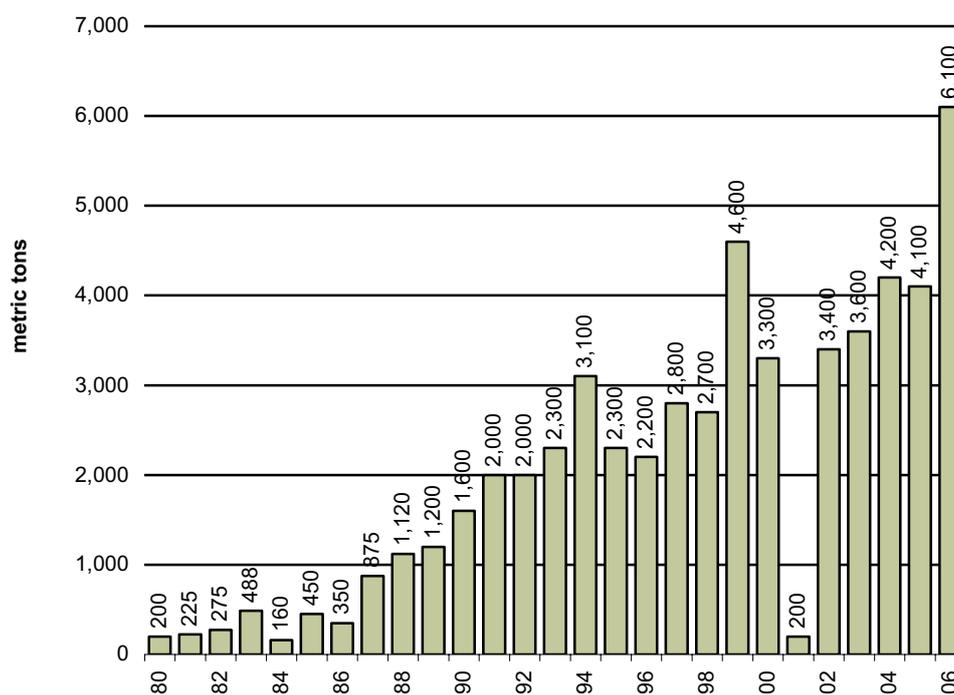
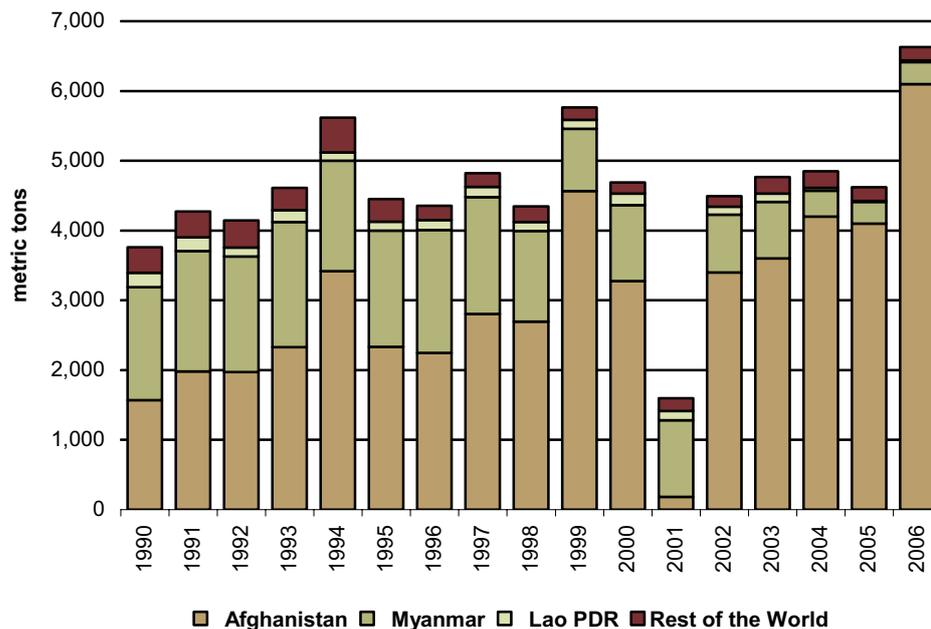


Figure 5: Global potential opium production (metric ton), 1990-2006

In 2006, the weighted average yield per ha decreased by 6% to 37.0 kg/ha, compared to 39.3 kg/ha in 2005. The largest declines were found in the Central and Western Regions where farmers reported losses due to drought.

In line with the rise in cultivation, potential opium production in Southern Afghanistan increased by 112% to 3,702 metric tons. This is equivalent to 61% of the total opium production in Afghanistan in 2006. Although yields were slightly higher than in 2005, opium production decreased by 14% in Northern Afghanistan to 945 metric tons, which is equivalent to 15% of the total production in 2006. In the Western Region, opium poppy cultivation remained stable, whereas opium production decreased by 22%, due to the drought problems in that region.

Opium poppy cultivation and security problems increased sharply in Southern Afghanistan in 2006

During the survey period, the security situation was fragile in most of the southern provinces. In the south, military operations were ongoing and Anti Government Elements (AGE) were very active. Unstable security conditions in the region reportedly played a major role in households' decisions about opium poppy cultivation, as the AGE were able to encourage and even threaten farmers to cultivate opium poppy. The security map (source: UNDSS) on page 20 shows the security situation (as at 8 August 2006) and the 2006 opium poppy cultivation level by province. Main increases in cultivation took place in the southern provinces where most of the high and extreme risk areas are located. Although the security situation was relatively good in Badakhshan, cultivation increased by 77% in 2006. However, opium poppy cultivation was mainly found in Dareem and Argo valleys, where the security was not good. In the plain areas close to the district centres, opium poppy cultivation was stable compared to 2005.

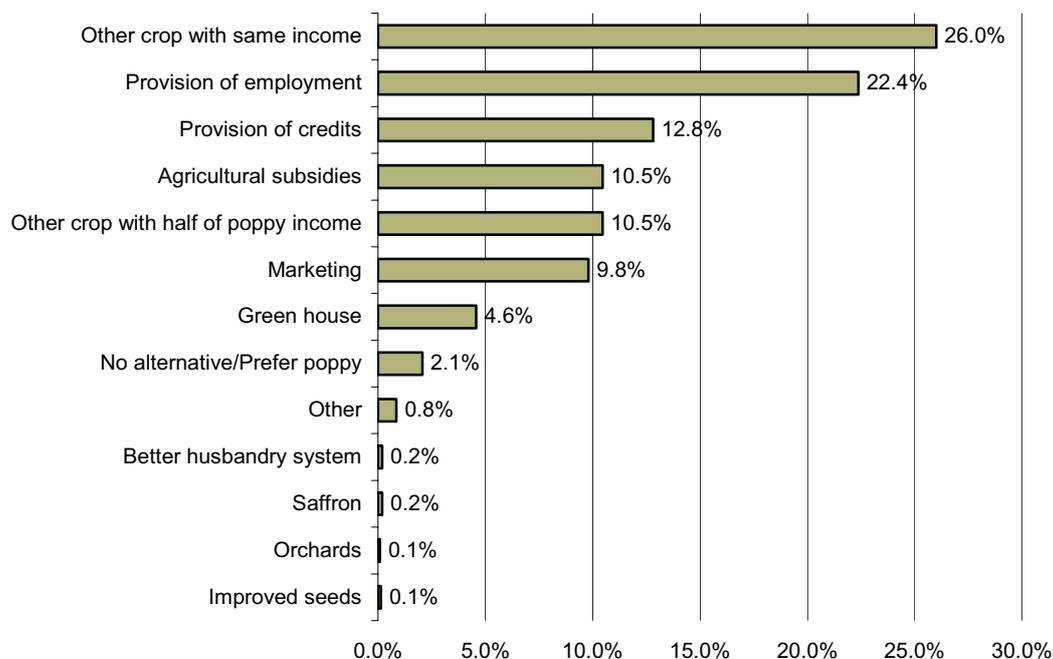
Eradication of opium poppy increases in 2006

In 2006, an estimated area of 15,300 ha of opium poppy fields was eradicated (with a confidence interval ranging from 14,130-16,060 ha). This is roughly 10% of the area under opium poppy cultivation in 2006, up from 5% of the cultivation area in 2005.

UNODC/MCN field surveyors visited nearly 1,400 villages in 19 provinces where opium poppy eradication was carried out by Governor-led eradication teams and verified 9,000 ha of eradicated

poppy fields (>18,000 fields). Governors reported eradication in another 320 villages which were not visited by the surveyors. Nationwide, Governors claimed 23,563 ha of eradication in at least 1,700 villages. The surveyors found that, on average, only 57% of these claims could be verified. Applying the average ratio between claimed and actual verified eradication over the total claims, it is estimated that 13,050 hectares were eradicated across Afghanistan in Governor-led eradication programs (4,000 ha in 2005). A further 2,250 ha of opium poppy fields were eradicated by the Afghanistan Eradication Force (AEF) in Helmand and Badakshan (210 ha in 2005)¹.

Figure 6: Alternatives reported by farmers for opium poppy (n=754 poppy growing farmers)



Opium prices fall slightly in 2006

In 2006, the weighted average fresh opium price at harvest time was US\$ 94/kg, 8% lower than in 2005. Also dry opium prices fell by 9% to US\$125 (weighted price) at harvest time in 2006. Although opium prices were lower than in the period 2001-2003, they are still three times higher than between 1994-2000.

Total farm-gate value of opium increases 34% to US\$ 755 million

Based on opium production and reported opium prices, the farm-gate value of the opium harvest amounted to US\$ 0.76 billion in 2006. Higher production (49%) and only slightly lower prices (-9%) resulted in a 35% increase of the overall farm-gate value of opium production compared to 2005 (0.56 billion). Since the Afghan GDP increased by 29%, the proportion of the farm-gate value of opium remained stable at 11% of GDP.

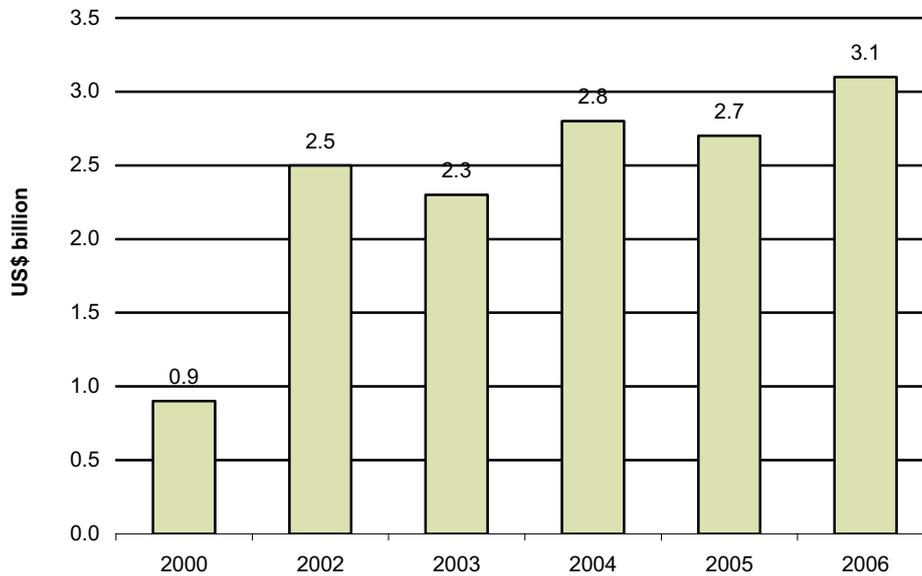
Value of opiate to neighbouring countries

The potential value of Afghanistan's 2006 opium harvest for the Afghan economy (accruing to farmers, laboratory owners and Afghan traffickers) was calculated to have reached about US\$ 3.1 billion, compared with US\$ 2.7 billion in 2005. The increase was about 15% and thus less than the increase in production (49%) – reflecting falling opium and heroin prices in neighbouring countries as Afghan drug exports increased. As compared to the year 2000, the overall opium

¹ UNODC/MCN did not verify AEF eradication.

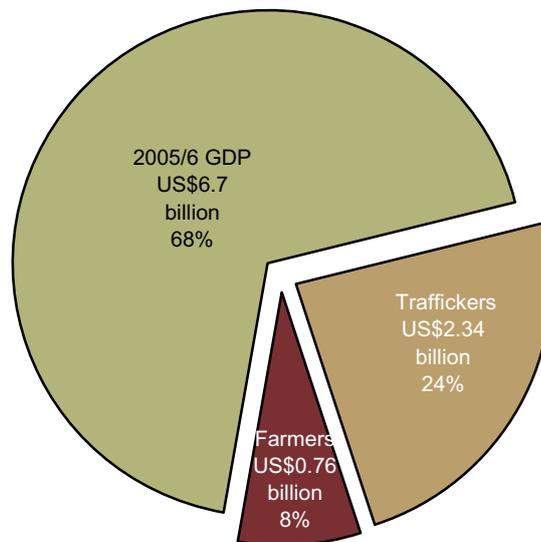
related income for the Afghan economy was, however, three times higher. UNODC calculations suggest that Afghan traffickers earned US\$ 1.2 billion in opium exports and US\$ 1.9 billion in heroin and morphine exports.

Table 4: Potential export value of opium production (US\$ billion), 2000-2006



Expressed as a percentage of licit GDP (US\$ 6.7 billion in 2005/6), the overall potential value-added of the opium sector for Afghanistan in 2006 is estimated to have been equivalent to 46% of licit GDP or 32% of the overall economy, if the opium sector is included in the economy. Given the strong growth of licit GDP, the overall size of the illicit opium industry in Afghanistan, declined, however, from 61% of licit GDP in 2004 to 52% in 2005 and 46% of licit GDP in 2006.

Figure 7: The licit economy and the opiate industry in Afghanistan, 2006



34% of farmers report that 'religion' is the main reason for never having cultivated opium poppy

As part of the survey, 3,107 farmers in 1,554 villages across Afghanistan were asked why they were growing or not growing opium poppy. Farmers who never cultivated opium poppy reported 'religion' as the main reason (34.4%), followed by 'illegal crop' (25.7%) and respect for a shura/elders decision (24.6%). Only 0.1% of the farmers did not cultivate opium poppy due to fear of eradication

The majority of the farmers (98%) reported that they are ready to stop opium poppy cultivation, if access to alternative livelihoods is provided. When asked about alternatives to opium poppy cultivation, 26% of the farmers preferred an equally profitable alternative crop, 22.4% employment opportunities, 12% provision of credits, 10.5% agricultural subsidies, 10.5% an alternative crop half as profitable as opium poppy and 9.8% better marketing possibilities for their products.

The largest opium poppy cultivation provinces are not the poorest

Village survey data on income in the previous year show that the average annual income of opium poppy growing households in 2005 was 36% higher than of non-growing households.

Opium poppy growing households in Southern Afghanistan earned a much higher annual income than in other regions. However, also non-growing households in Southern Afghanistan region reported higher incomes than in other regions. In Central Afghanistan the annual income of both opium poppy growing and non-growing households was among the lowest.

Of the five main opium cultivation provinces in 2006 (Hilmand, Badakhshan, Kandahar, Uruzgan and Farah), only one province (Badakhshan) reported lower income levels. The average annual household income in the other four provinces was relatively high, between US\$ 1601-2000. In the poorest provinces (US\$ 800-1100), Badakhshan, Bamyan, Wardak and Paktika, the level of opium poppy cultivation in 2006 was negligible, except in Badakhshan.

Methodology

The methodology of the Opium Survey in 2006 covered various aspects such as estimations of the extent of opium poppy cultivation, opium yield and production, opium prices and the opium poppy growth calendar. It also included socio-economic aspects such as the number of families involved in opium poppy cultivation, the number of opium addicts in Afghanistan and the income from opium to farmers and traffickers. The survey methodology was based on a sampling approach that combined the use of satellite imagery and extensive field visits.

The opium poppy cultivation area was estimated using 210 high resolution images (Ikonos and Quickbird), which represented 16% of the total agricultural area in the 19 main opium poppy producing provinces in Afghanistan. High resolution images were acquired for the pre-harvest and a post-harvest period for each selected sample site, which aided in the discrimination of poppy from other crops. In view of the available budget, the total number of high resolution images was limited to 105 pairs (210 multi-spectral images) well distributed within 19 provinces. The distribution was based on the number of cells in the sampling frame and total arable land in each province.

Additionally, some 110 surveyors visited 1554 villages to collect data on opium poppy cultivation in 34 provinces. Villages were stratified according to the elevation and selection was done by using systematic random selection method in each group. Selected villages were geographically and statistically well distributed in all 34 provinces. Surveyors conducted interviews with 3154 farmers and 1554 headmen. For provinces not covered by satellite imagery, opium poppy cultivation estimates were derived from ground survey findings.

The sample for the yield survey tripled in 2006 and a total of 714 fields (in 320 villages) were visited by 70 surveyors who measured 25,355 capsules.

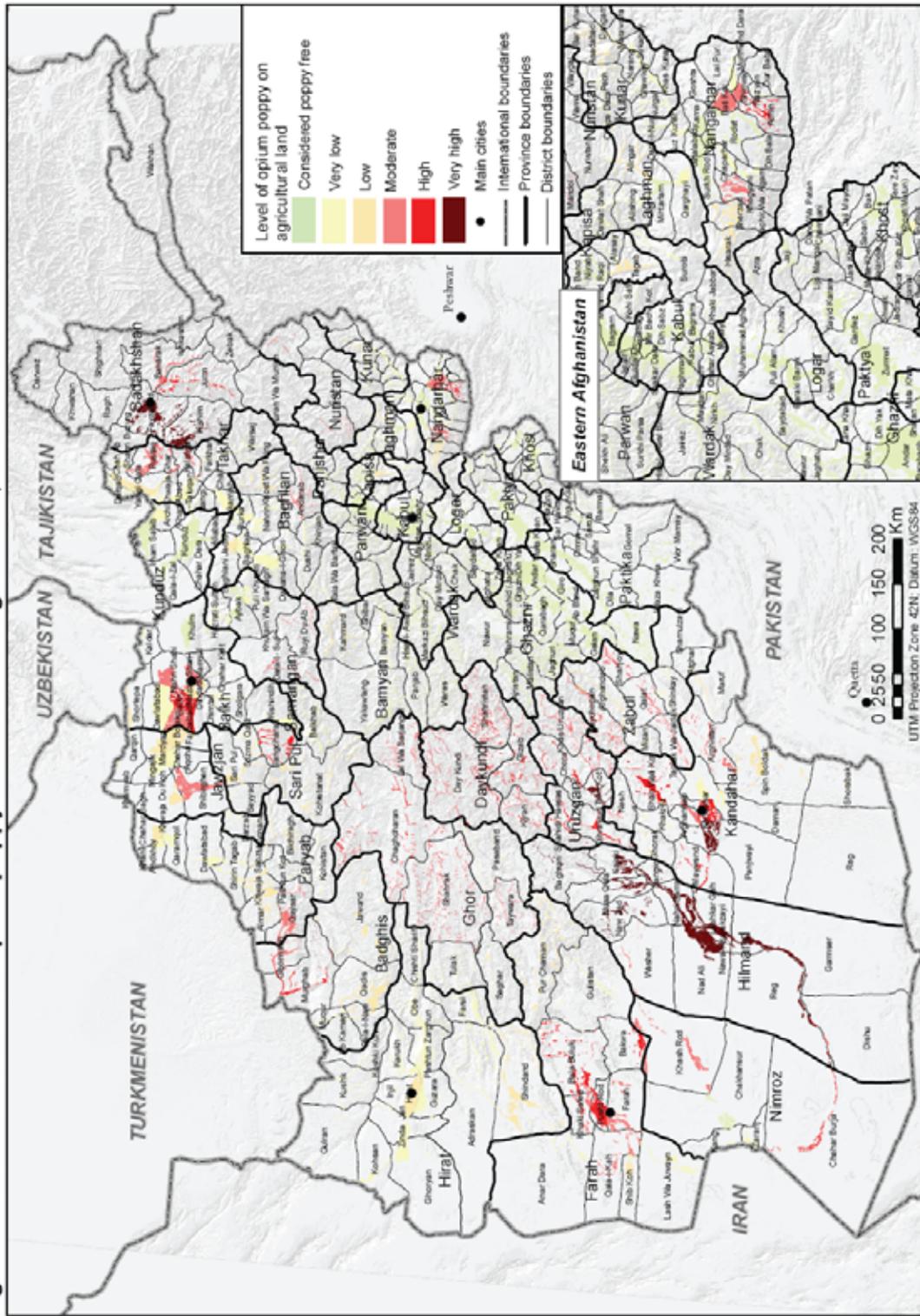
The eradication verification survey was implemented separately by 40 surveyors who visited 1400 villages and around 18,000 opium poppy fields. A total of 45 surveyors collected ground reference data, which supported the interpretation of the satellite images.

In 2006 (including the Rapid Assessment Survey, The Eradication Verification Survey and the Annual Opium Survey), a total of 320 surveyors collected ground data/information on opium poppy cultivation, eradication and socio-economic variables in Afghanistan in around 3500 villages.

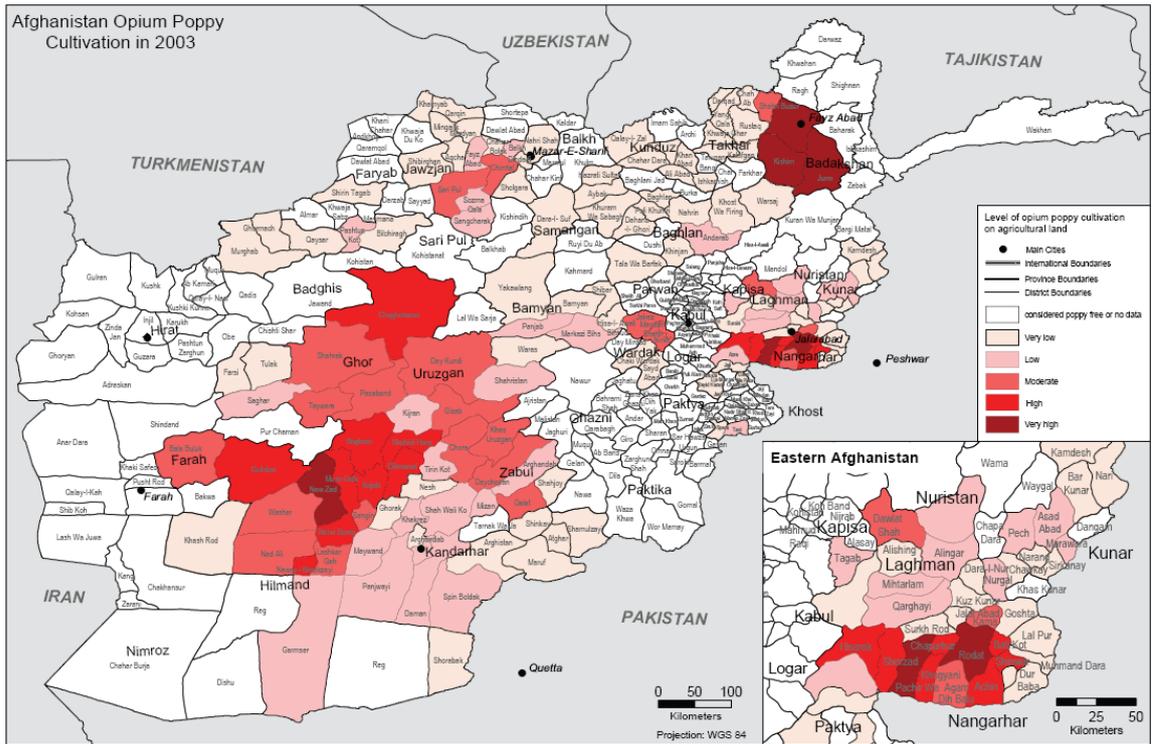
For all surveys experienced surveyors were selected from the UNODC surveyor pool like in previous years, based on their previous performance. Security was generally problematic for the surveyors, but recruitment of surveyors originating from the corresponding region helped to reduce the security risk.

As part of the capacity building in Afghan Government, trainings for surveyors were given jointly by MCN/UNODC local staff. MCN/UNODC survey coordinators monitored and supervised the survey in their concerned regions. Additionally, MCN local staff was trained on map preparation.

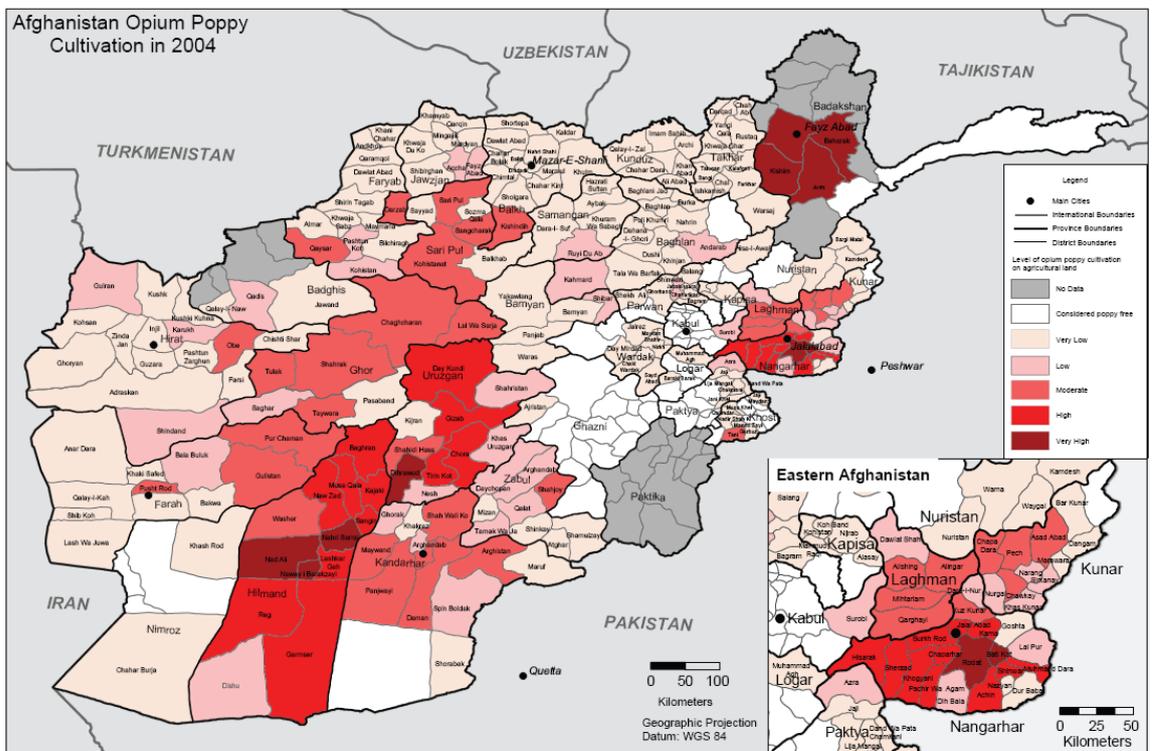
Agricultural land and level of opium poppy cultivation in Afghanistan, 2006



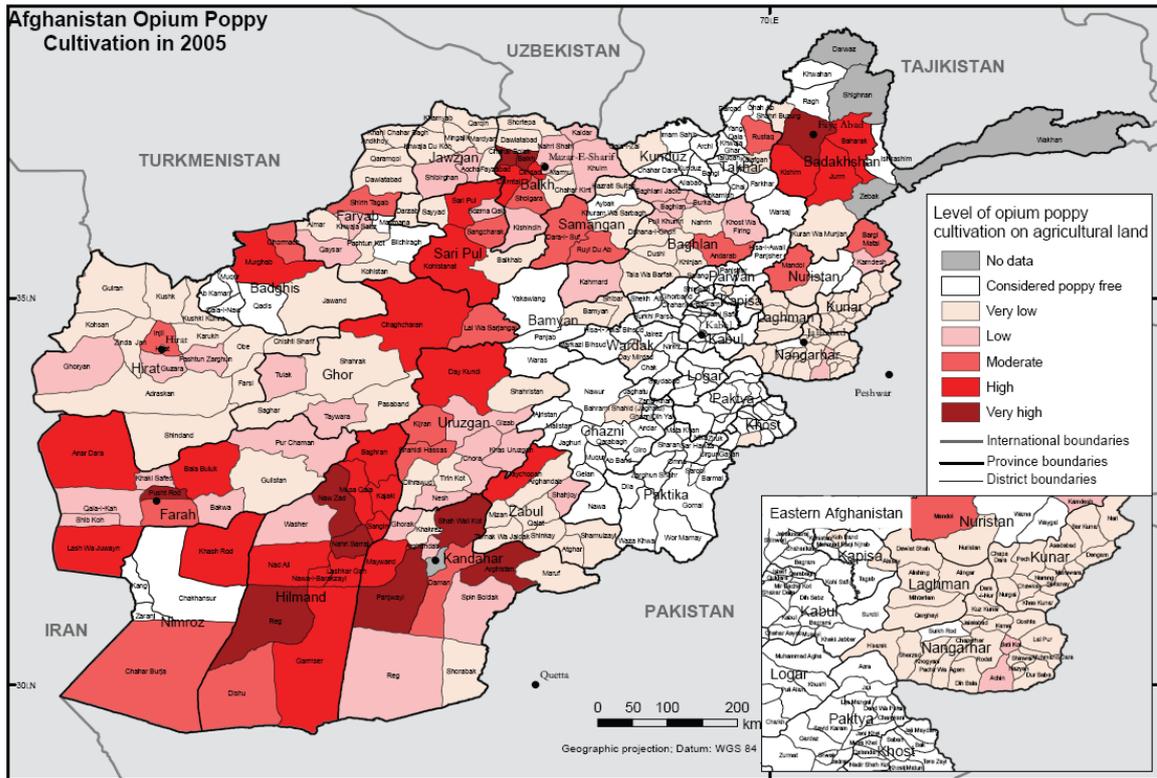
Source: MCN - UNODC Afghanistan Opium Survey 2006
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.



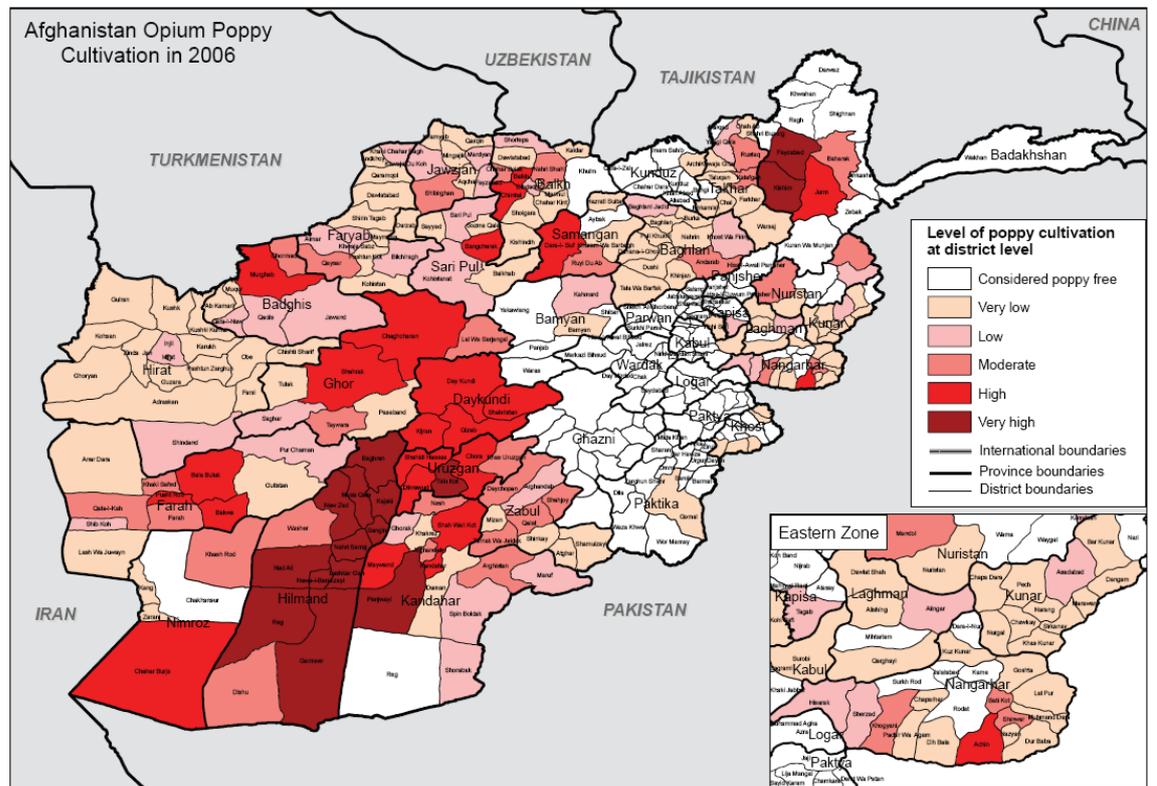
Source: CND - UNODC Afghanistan Opium Survey 2003 (http://www.unodc.org/unodc/en/crop_monitoring.html)
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.



Remarks: The 2004 survey was not designed to establish district estimates. The levels of cultivation by district presented on this map are only indicative. Although no data is available for the province of Paktika, anecdotal reports confirm presence of opium poppy cultivation there.
 Source: CND - UNODC Afghanistan Opium Survey 2004 (http://www.unodc.org/unodc/en/crop_monitoring.html)
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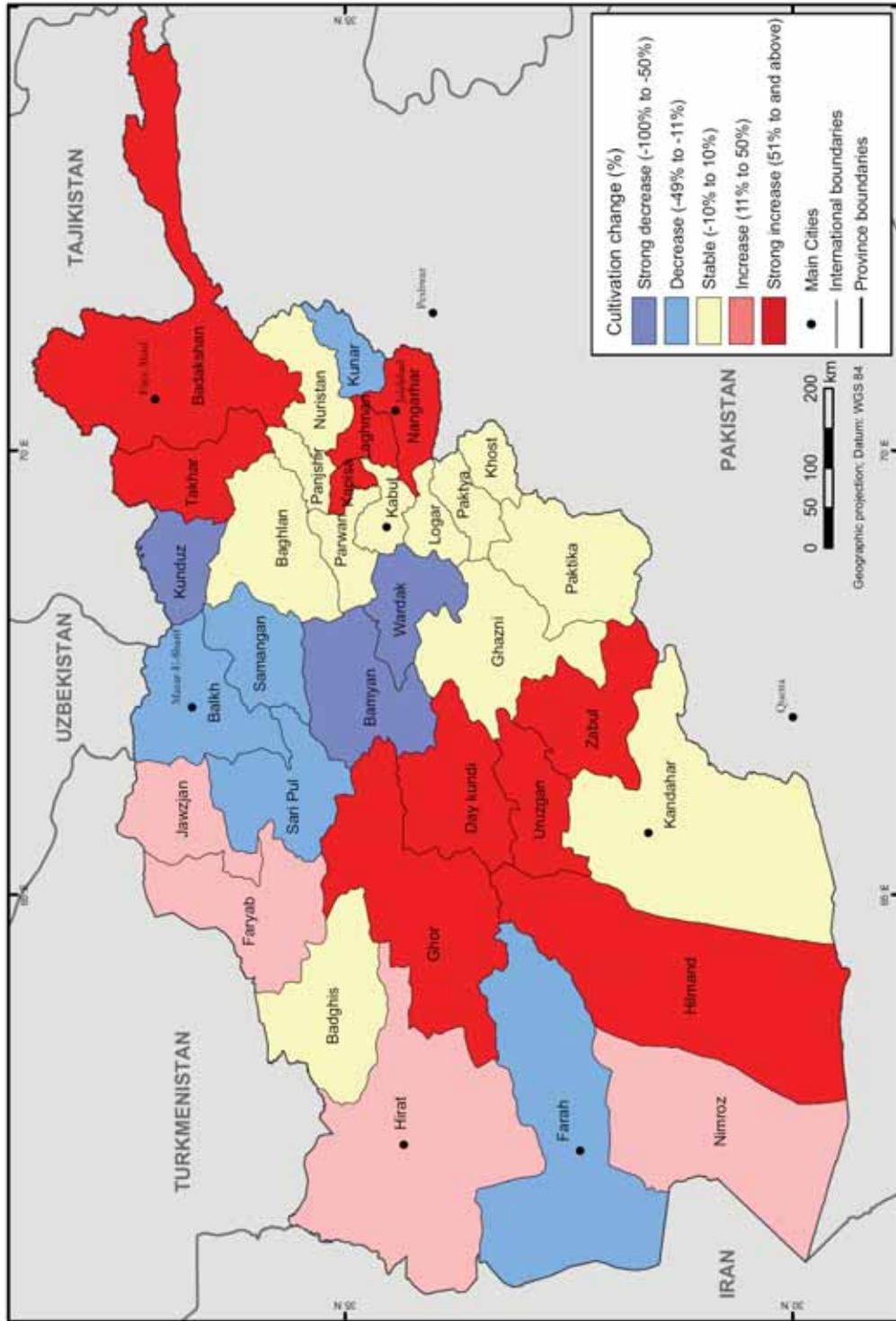


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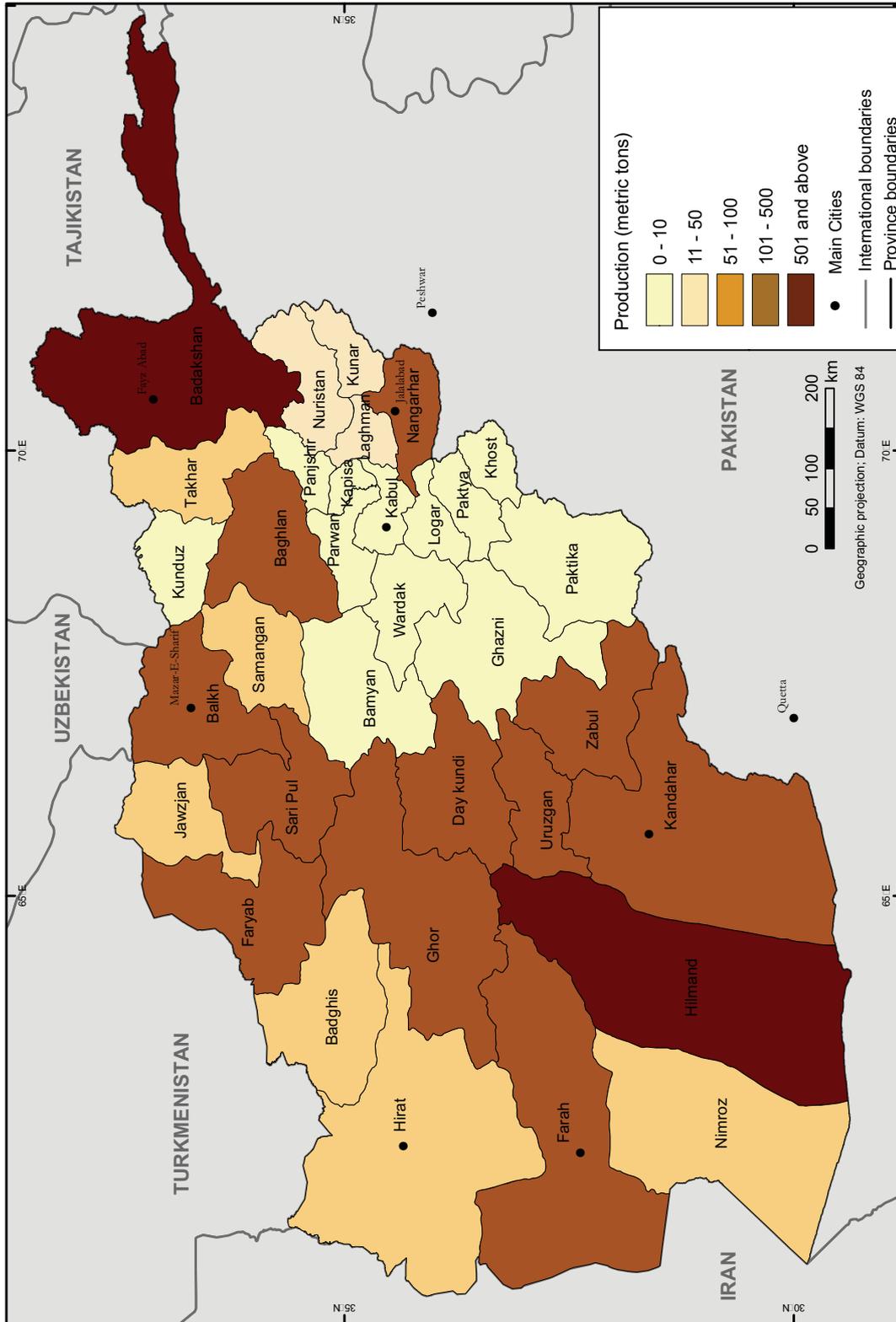
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Opium poppy cultivation change in Afghanistan by province, 2005 - 2006



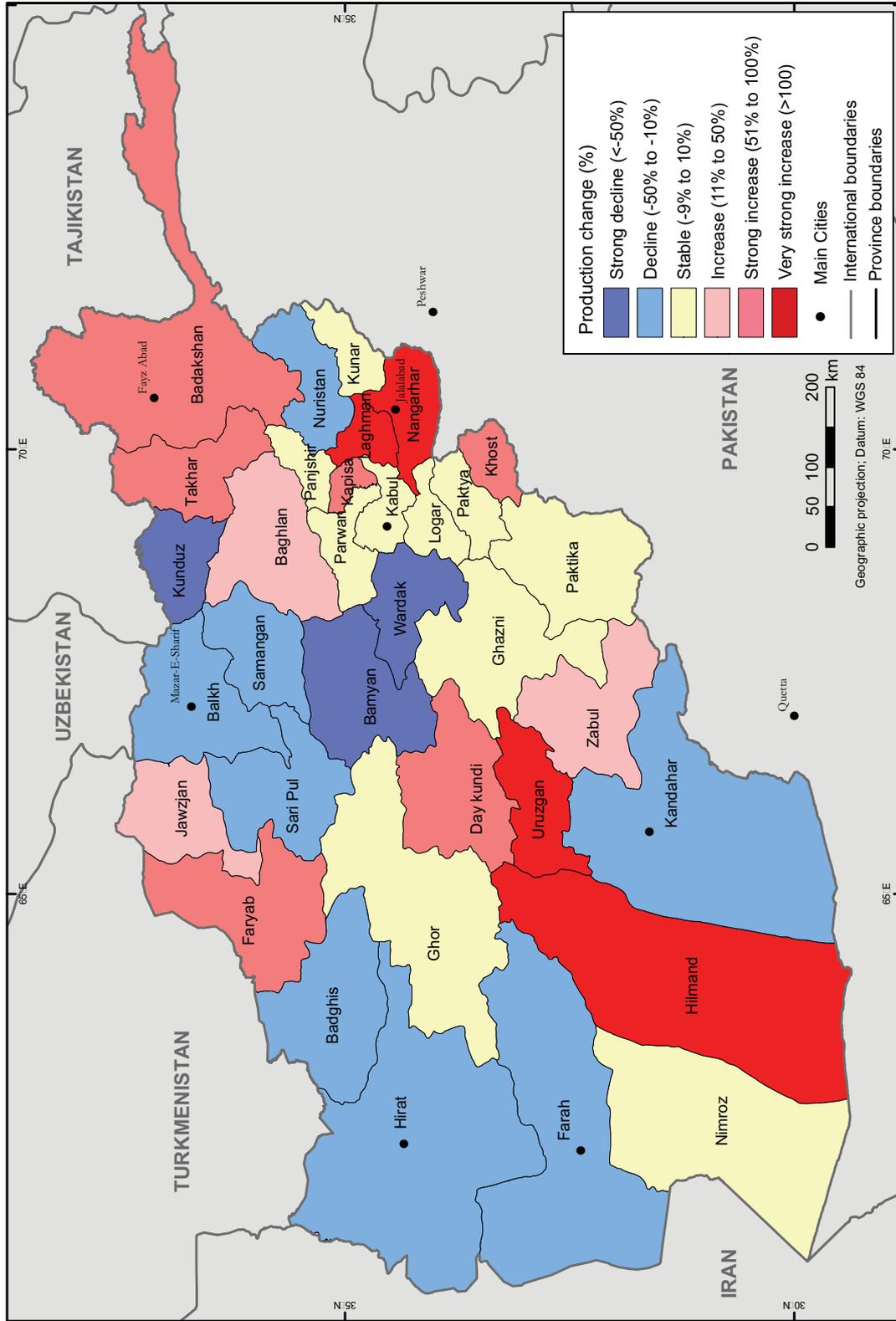
Source: MCN - UNODC Afghanistan Opium Survey 2006
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Opium production in Afghanistan by province, 2006



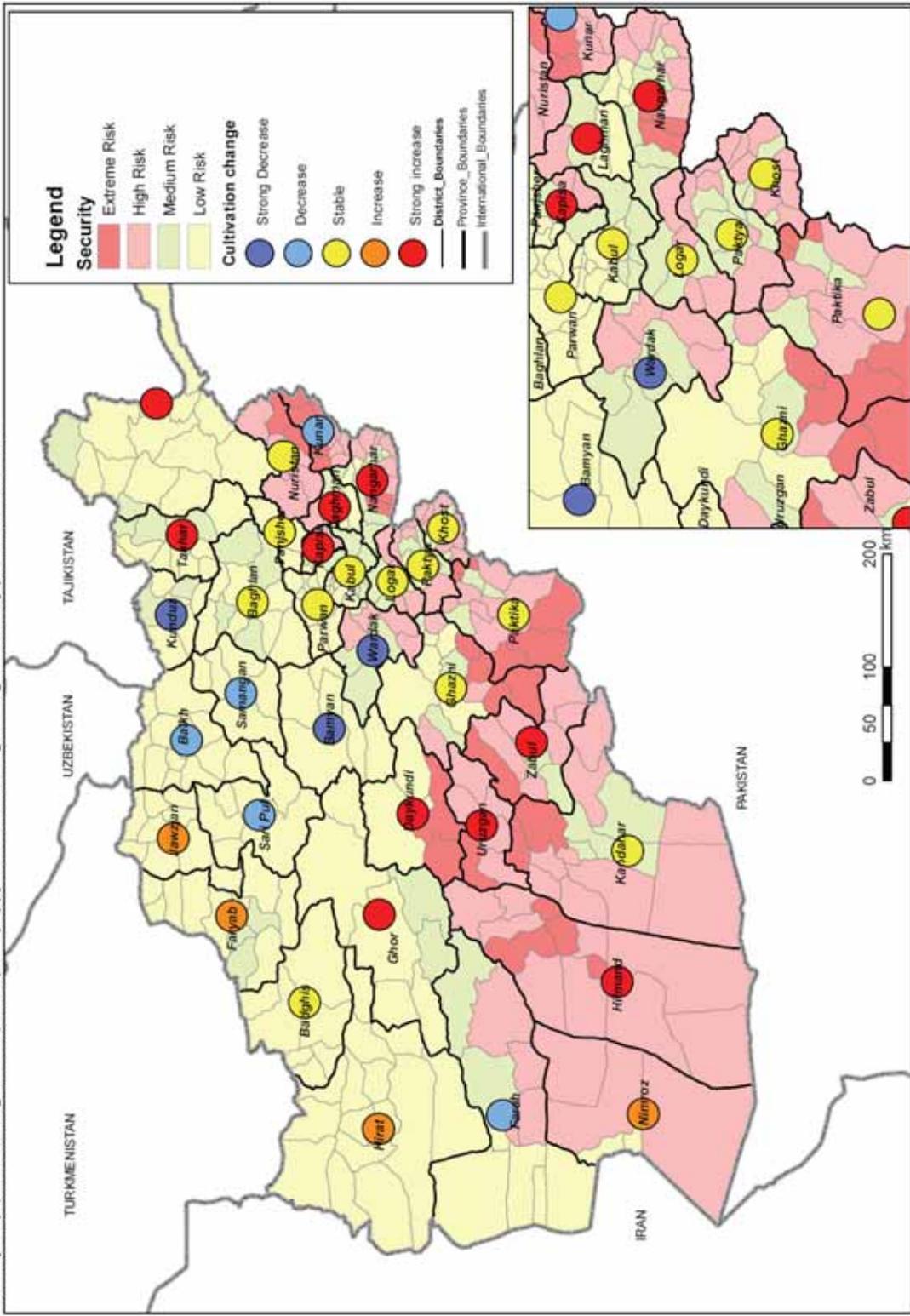
Source: MCN - UNODC Afghanistan Opium Survey 2006
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Opium production change in Afghanistan, 2005-2006 (at province level)

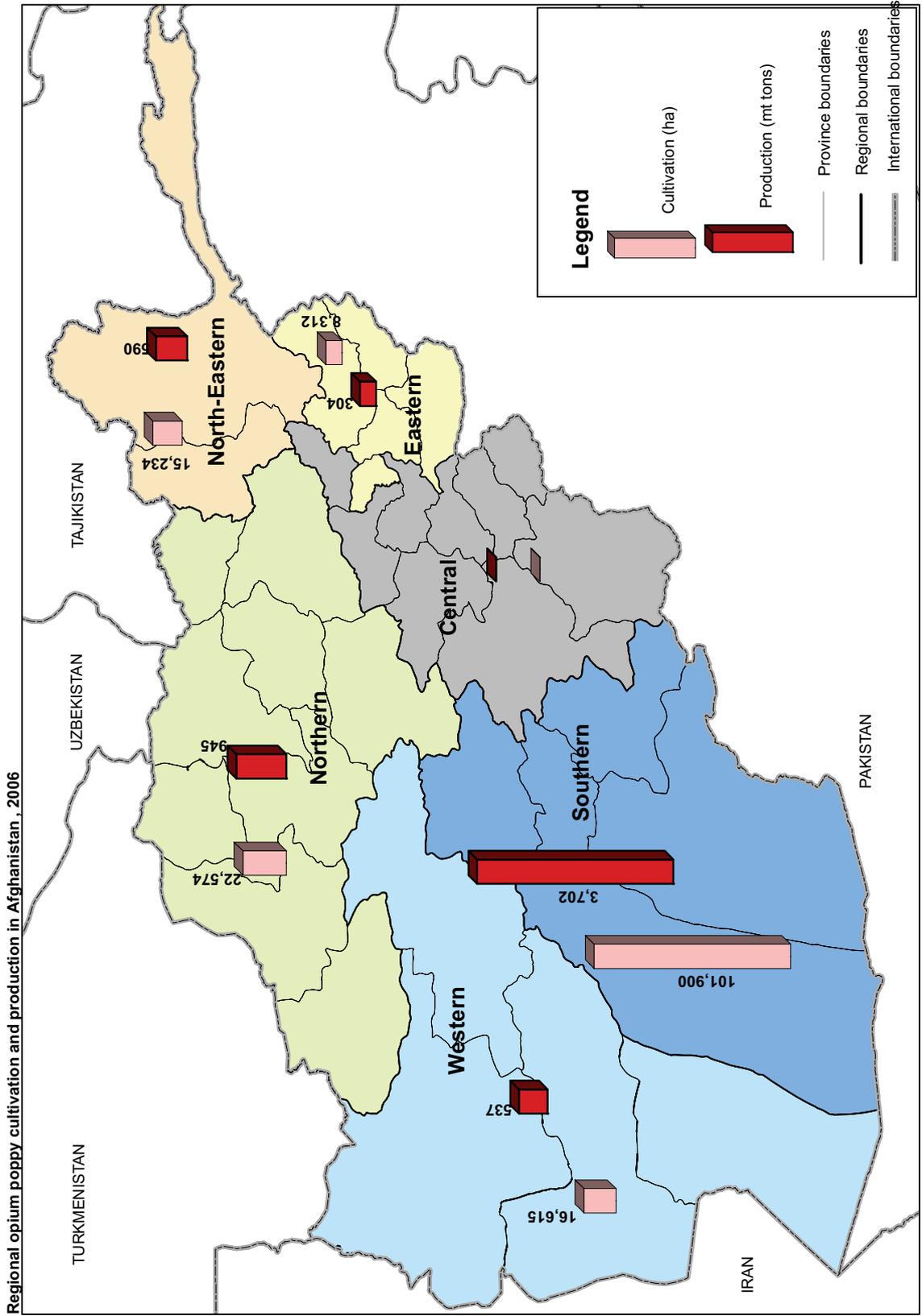


Source: MCN - UNODC Afghanistan Opium Survey 2006
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Security map (as at 08 August 2006) and opium poppy cultivation change in Afghanistan by province, 2005-2006



Source security map: UNDOSS
 Source cultivation: MCN-UNODC Afghanistan Opium Poppy Survey 2006
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations



1 INTRODUCTION

The Afghanistan opium survey is implemented annually by the United Nations Office on Drugs and Crime and, since 2003, in collaboration with the Afghan Government. The survey team collects and analyses information on the location and extent of opium poppy cultivation, the potential production of opium, and the socioeconomic dimensions of the problem. The results provide a detailed picture of the outcome of the current year's opium season and, with previous years' data, enable the identification of mid- and long-term trends in the evolution of the illicit drug problem. This information is essential for planning, implementing and monitoring the impact of measures required for tackling a problem, which has serious implications for both the country and the international community.

The opium survey is implemented in the technical framework of UNODC's Illicit Crop Monitoring Programme (ICMP). The objective of ICMP is to assist the international community in monitoring the extent and evolution of illicit crops in the context of the elimination objective adopted at the General Assembly Special Session on Drugs in June 1998. In the framework of ICMP, monitoring activities are presently supported by UNODC in the other five main countries affected by illicit opium poppy and coca bush cultivation (Myanmar and Lao PDR in Asia, and Colombia, Peru and Bolivia in Latin America), as well as in Morocco, where one of the main areas of illicit cannabis cultivation is located.

The 2006 opium survey in Afghanistan was implemented under the project AD/AFG/F98 "Monitoring of opium production in Afghanistan" and the project AD/GLO/C93 "Illicit Crop Monitoring Programme Support", with financial contributions from the Governments of Finland, the United Kingdom, and the United States of America.

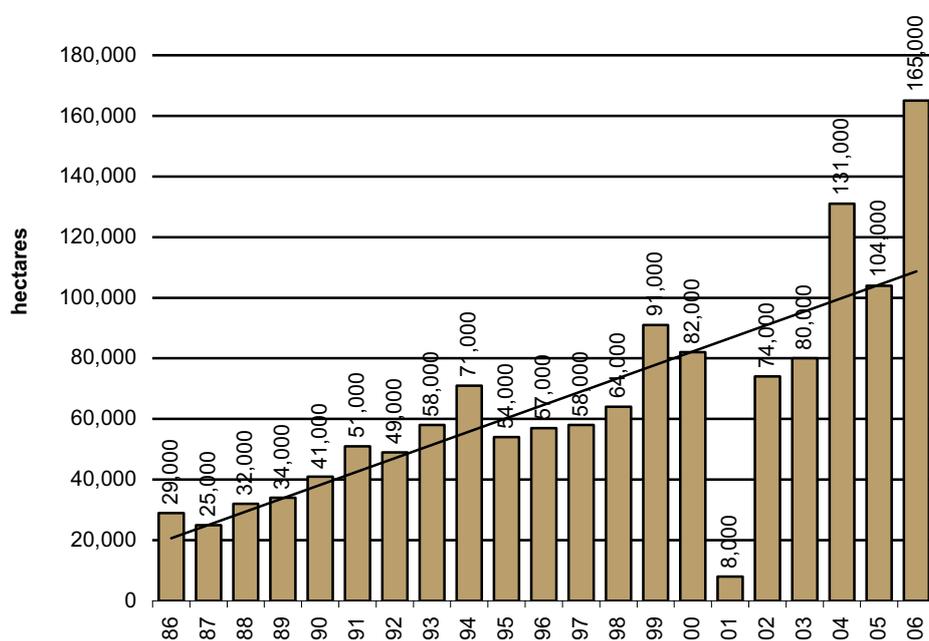
2 FINDINGS

2.1 Opium Poppy Cultivation

The estimated area under opium poppy cultivation in Afghanistan increased by 59% to 165,000 hectares in 2006 (confidence interval: 150,000-180,000 ha). This increase is in line with the findings of the Rapid Assessment Survey implemented in January-February 2006 (UNODC, *Afghanistan Opium Rapid Assessment Survey*, February 2006).

In 2006, opium poppy cultivation in Afghanistan increased by more than 10% in 14 provinces, while it remained stable (less than 10% up or down) in 12 mostly eastern and central provinces. Decreases were found in 8 provinces, mainly located in northern Afghanistan. The survey did not find any opium cultivation in Paktika, Paktia, Wardak, Logar, Panjshir and Ghazni provinces.

Figure 8: Opium poppy cultivation in Afghanistan (hectares), 1986 - 2006

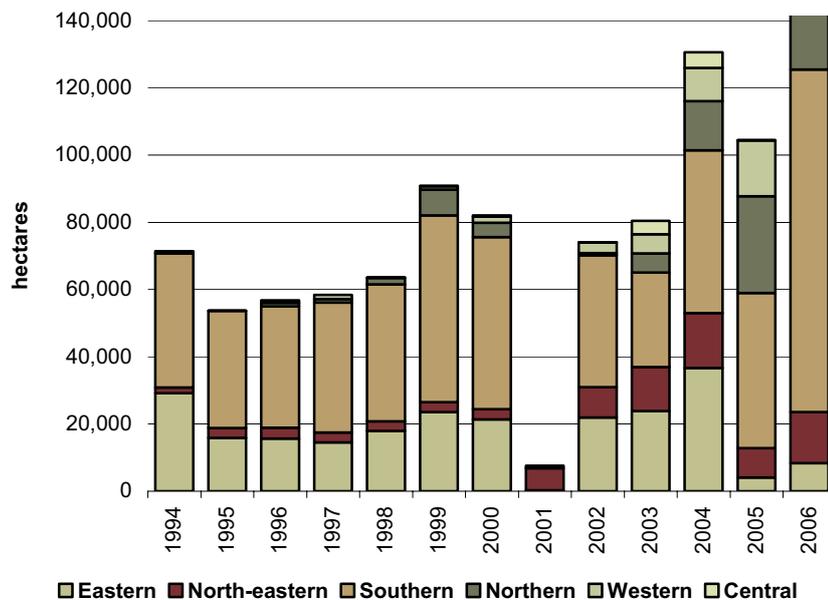


Sources: UNODC opium surveys for 1994-2006 and UNODC, *Global Illicit Drug Trends 2001* for previous years.

Opium poppy cultivation in the Southern Region increased by 55,753 ha (121%), which accounts for the main part of the total increase in opium poppy cultivation in 2006 (61,000 hectares). It was reported that, due to the security problems in the Southern Region, so-called Anti Government Elements (AGE) encouraged farmers to cultivate opium poppy and even threatened them when they were reluctant to do so. Opium poppy cultivation in 2006 in the Southern Region (101,900 ha) was almost equal to the total opium poppy cultivation in Afghanistan in 2005 (104,000 ha). At present, a large part of the Southern Region is closed to UN missions. In addition, most of the NGOs providing services in this region had to leave. Eradication campaigns carried out by the Government were not having a strong impact in this region due to the security problems, except in Kandahar province.

Table 5: Regional distribution of opium poppy cultivation, 2005 - 2006

Region	2005 (ha)	2006 (ha)	Change 2005-2006	2005 as % of total	2006 as % of total
Southern	46,147	101,900	121%	44%	62%
Northern	28,282	22,574	-20%	27%	14%
Western	16,543	16,615	0%	16%	10%
North-Eastern	8,734	15,234	74%	8%	9%
Eastern	4,095	8,312	103%	4%	5%
Central	106	337	218%	0%	0%
Rounded Total	104,000	165,000	59%	100%	100%

Figure 9: Regional distribution of opium poppy cultivation 1994 – 2006

Most of the opium poppy cultivation in the south took place in Hilmand. This province alone accounted for 42% (69,324 ha) of the total opium poppy cultivation in Afghanistan in 2006. The current opium poppy cultivation level in Hilmand alone was higher than the cultivation levels for the entire country in the years 1986-1993, 1995-1997 and 2001.

Large increases in absolute terms took also place in Uruzgan, Badakshan, Day Kundi and Nangarhar (7,679 ha, 5,686 ha, 4,463 ha, and 3,779 ha respectively). The largest reductions were found in Balkh and Farah (-3,605 ha and -2,546 ha respectively).

Table 6: Opium poppy cultivation in main cultivation provinces (hectares), 2003 – 2006

Province	2003	2004	2005	2006	Change 2005-2006	2006 as % of total	Cumulative %
Hilmand	15,371	29,353	26,500	69,324	162%	42%	42%
Badakhshan	12,756	15,607	7,370	13,056	77%	8%	50%
Kandahar	3,055	4,959	12,989	12,619	-3%	8%	58%
Uruzgan	4,698	N/A	2,024	9,773	383%	6%	63%
Farah	1,700	2,288	10,240	7,694	-25%	5%	68%
Balkh	1,108	2,495	10,837	7,100	-34%	4%	72%
Day Kundi	2,445	N/A	2,581	7,044	173%	4%	77%
Rest of the Country	38,867		31,459	38,390	22%	23%	100%
Rounded Total	80,000	131,000	104,000	165,000	59%		

Table 7: Opium poppy cultivation (2004-2006) and eradication (2005-2006) in Afghanistan

PROVINCE	Cultivation 2004 (ha)	Cultivation 2005 (ha)	Cultivation 2006 (ha)	Change 2005-2006 (ha)	Change 2005-2006 (%)	Estimated total area of eradication (ha) 2005	Estimated total area of eradication (ha) 2006
Kabul	282	0	80	80	100%	0	0
Khost	838	0	133	133	100%	0	0
Logar	24	0	0	0	0%	0	0
Paktya	1,200	0	0	0	0%	0	0
Panjshir	0	0	0	0	0%	0	0
Parwan	1,310	0	124	124	100%	0	0
Wardak	1,017	106	0	-106	-100%	0	0
Ghazni	62	0	0	0	0%	0	0
Paktika	0	0	0	0	0%	0	0
Central Region	4,733	106	337	231	218%	0	0
Kapisa	522	115	282	167	145%	20	0
Kunar	4,366	1,059	932	-127	-12%	126	44
Laghman	2,756	274	710	436	159%	360	9
Nangarhar	28,213	1,093	4,872	3,779	346%	1860	337
Nuristan	764	1,554	1,516	-38	-2%	0	5
Eastern Region	36,621	4,095	8,312	4,217	103%	2,366	395
Badakhshan	15,607	7,370	13,056	5,686	77%	144	921
Takhar	762	1,364	2,178	814	60%	100	35
North Eastern Region	16,369	8,734	15,234	6,500	74%	244	956
Badghis	614	2,967	3,205	238	8%	0	602
Baghlan	2,444	2,563	2,742	179	7%	63	22
Balkh	2,495	10,837	7,232	-3,605	-33%	840	2370
Bamyan	803	126	17	-109	-87%	0	0
Faryab	3,249	2,665	3,040	375	14%	0	264
Jawzjan	1,673	1,748	2,024	276	16%	0	48
Kunduz	224	275	102	-173	-63%	0	0
Samangan	1,151	3,874	1,960	-1,914	-49%	16	136
Sari Pul	1,974	3,227	2,252	-975	-30%	112	1981
Northern Region	14,627	28,282	22,574	-5,708	-20%	1,031	5,423
Hilmand	29,353	26,500	69,324	42,824	162%	1046	4973
Kandahar	4,959	12,989	12,619	-370	-3%	48	2829
Uruzgan	11,080	2,024	9,703	7,679	379%	126	0
Zabul	2,977	2,053	3,210	1,157	56%	0	0
Day kundi	N/A	2,581	7,044	4,463	173%	0	28
Southern Region	48,369	46,147	101,900	55,753	121%	1,220	7,830
Farah	2,288	10,240	7,694	-2,546	-25%	86	562
Ghor	4,983	2,689	4,679	1,990	74%	0	0
Hirat	2,531	1,924	2,287	363	19%	156	113
Nimroz	115	1,690	1,955	265	16%	0	26
Western Region	9,917	16,543	16,615	72	0%	242	701
Total (rounded)	131,000	104,000	165,000	61,000	59%	5,100	15,300

SOUTHERN REGION (Hilmand, Uruzgan, Kandahar, Zabul)

The increase in the opium poppy cultivation and opium production in the Southern provinces in 2006 was the main reason for the overall increase in Afghanistan. The total cultivation in the Southern Region amounted to 101,900 ha, which is equivalent to 62% of the total cultivation in Afghanistan. A total of 3,703 mt of opium was produced, which is 61% of the total production in Afghanistan in 2006.

Table 8: Opium poppy cultivation and eradication in the Southern Region (hectares), 2004 - 2006

PROVINCE	Cultivation 2004 (ha)	Cultivation 2005 (ha)	Cultivation 2006 (ha)	Change 2005-2006 (ha)	Change 2005-2006 (%)	Estimated total area of eradication (ha) 2005	Estimated total area of eradication (ha) 2006
Hilmand	29,353	26,500	69,324	42,824	162%	1046	4973
Kandahar	4,959	12,989	12,619	-370	-3%	48	2829
Uruzgan	11,080	2,024	9,703	7,679	379%	126	0
Zabul	2,977	2,053	3,210	1,157	56%	0	0
Day kundi	N/A	2,581	7,044	4,463	173%	0	28
Southern Region	48,369	46,147	101,900	55,753	121%	1,220	7,830

Table 9: Opium production in the Southern Region (metric tons), 2005 - 2006

PROVINCE	Production 2005 (mt)	Production 2006 (mt)	Change 2005-2006 (mt)	Change 2005-2006 (%)
Day Kundi	98	148	50	51%
Hilmand	1004	2801	1797	179%
Uruzgan	77	236	159	206%
Zabul	78	113	35	45%
Kandahar	492	405	-87	-18%
Southern Region	1749	3703	1954	112%

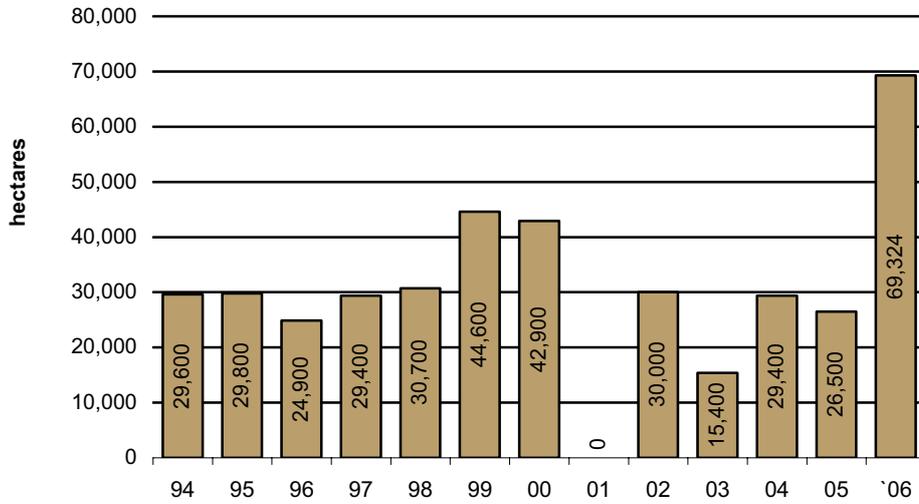
Hilmand

From 2005 to 2006, opium poppy cultivation in Hilmand increased by 162% to a record level of 69,324 ha. Hilmand accounted for 42% of the country's total opium poppy cultivation in 2006, compared to 25% in 2005, 23% in 2004, and 19% in 2003.

Information gathered during the field work provided clear indications of higher levels of cultivation in the central districts of the province such as Nade-Ali, Nahri Sarraj, and Nawa-I Barakzai, compared to the other districts. Eradication was almost two times higher than 2005. However, this did not lead to a reduction in the area under opium poppy cultivation in the province. One of the main reasons was the encouragement of farmers by AGE during the planting season – October/November 2005 - to plant considerably more opium poppy.

Opium production reached 2,801 mt in 2006, an increase by 179%. This amount is equal to the 46% of the opium production in the country in 2006.

Figure 10: Opium poppy cultivation in Hilmand province (hectares), 1994 - 2006



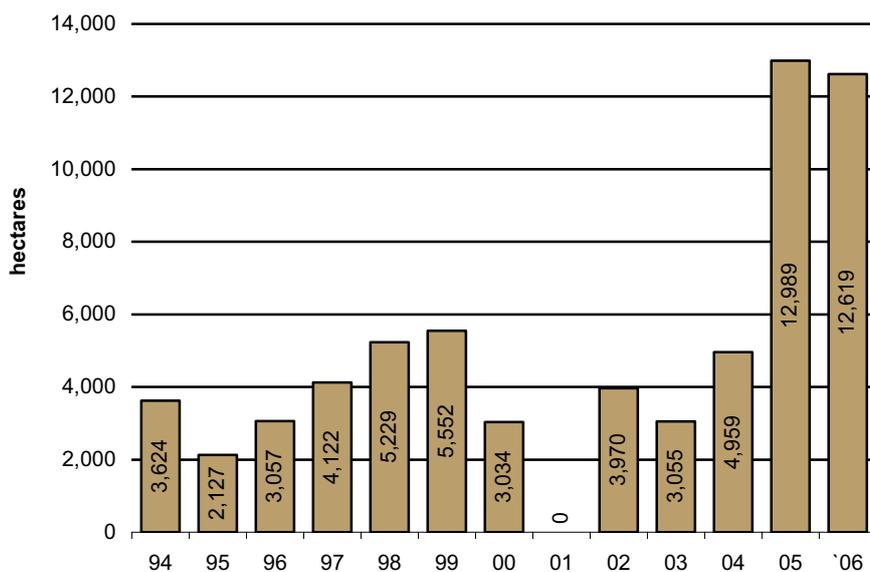
Kandahar

In 2006, opium poppy cultivation amounted to 12,619 ha in Kandahar, which is a 3% decrease compared to 2005. This is the second highest level of opium poppy cultivation in Kandahar on record. The main opium poppy cultivation districts in 2006 were Panjwai, Maiwand, Shaliwakot and Kandahar districts.

Production decreased by 18% to 405 mt, which is equivalent to 7% of the total production in Afghanistan in 2006.

Eradication verified by MCN-UNODC was estimated as 2,829 ha in 2006, compared to only 48 ha in 2005.

Figure 11: Opium poppy cultivation in Kandahar province (hectares), 1994 - 2006



Uruzgan and Day Kundi

In 2005, Uruzgan province was divided into two parts, Day Kundi and Uruzgan. Opium poppy cultivation in both provinces increased significantly in 2006. Cultivation reached 9,703 ha in Uruzgan, and increase by 379%, and 7,044 in Day Kundi (173% increase). Eradication was not observed in neither of the two provinces in 2006. Security was also very bad in most parts of these two provinces in 2006.

Zabul

Climatic conditions in Zabul are not favourable for opium poppy cultivation. Therefore, cultivation has been relatively stable at 2,000-3,000 ha since 2002. Security in the province was not good in 2006.

Figure 12: Opium poppy cultivation in Uruzgan province (hectares), 1994 - 2006

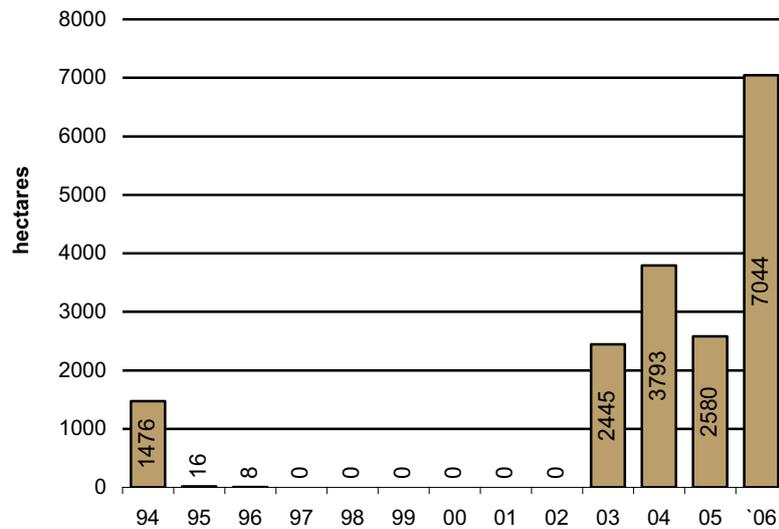
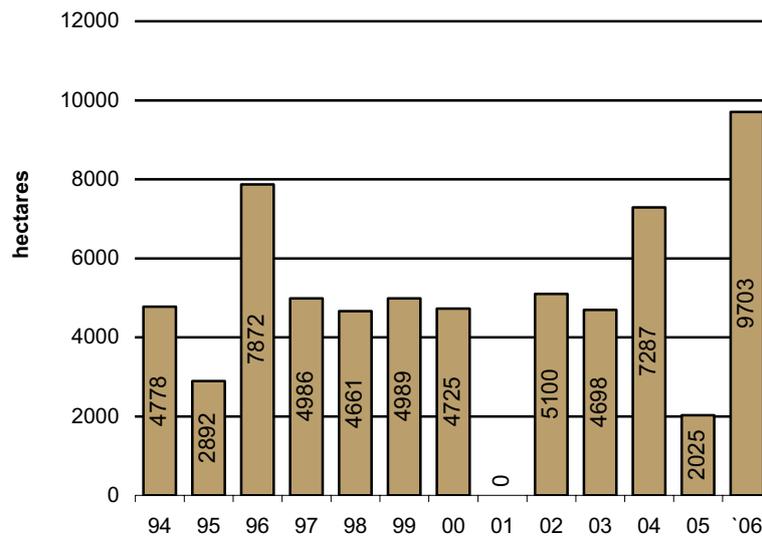
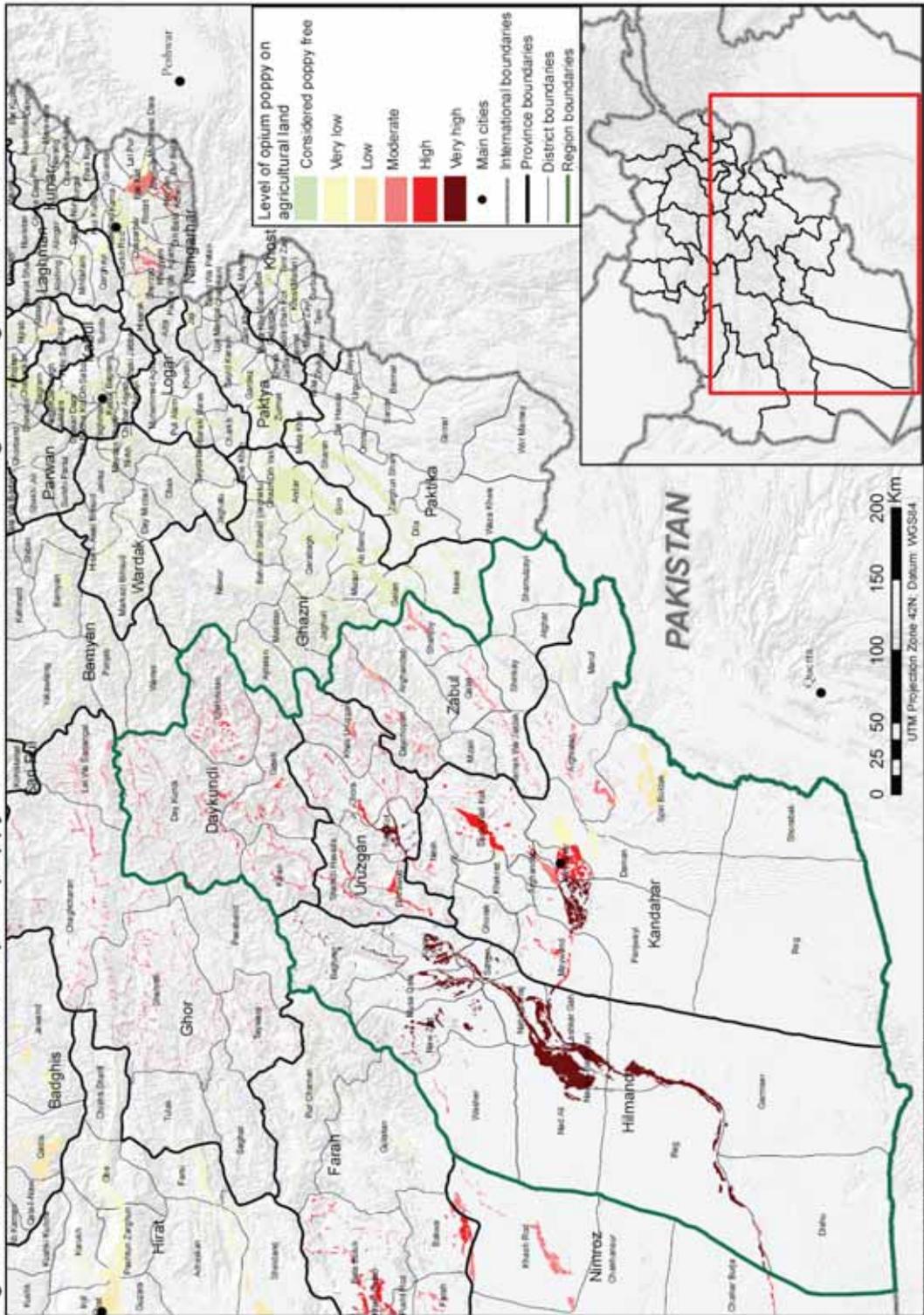


Figure 13: Opium poppy cultivation in Day Kundi province, 1994 - 2006



Agricultural land and level of opium poppy cultivation in the Southern region in Afghanistan, 2006



Source: ICN - UNODC Afghanistan Opium Survey 2006
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

EASTERN REGION (Nangarhar, Kunar, Laghman, Nuristan, Kapisa)

Although opium poppy cultivation increased by 103% in the Eastern region in 2006, it is still far from the 2004 level of 36,621 ha. A total of 8,312 ha of opium poppy was cultivated, which is equivalent to 5% of the total cultivation in Afghanistan in 2006. Opium production increased by 69% to 304 mt, which is 5% of the total opium production in Afghanistan. Eradication was less than last year because cultivation in 2006 mainly happened in remote areas and small valleys where the security situation was not very favorable.

Table 10: Opium poppy cultivation and eradication in the Eastern Region (hectares), 2004 - 2006

PROVINCE	Cultivation 2004 (ha)	Cultivation 2005 (ha)	Cultivation 2006 (ha)	Change 2005-2006 (ha)	Change 2005-2006 (%)	Estimated total area of eradication (ha) 2005	Estimated total area of eradication (ha) 2006
Kapisa	522	115	282	167	145%	20	0
Kunar	4,366	1,059	932	-127	-12%	126	44
Laghman	2,756	274	710	436	159%	360	9
Nangarhar	28,213	1,093	4,872	3,779	346%	1860	337
Nuristan	764	1,554	1,516	-38	-2%	0	5
Eastern Region	36,621	4,095	8,312	4,217	103%	2,366	395

Table 11: Opium production in the Eastern Region (metric tons), 2005 - 2006

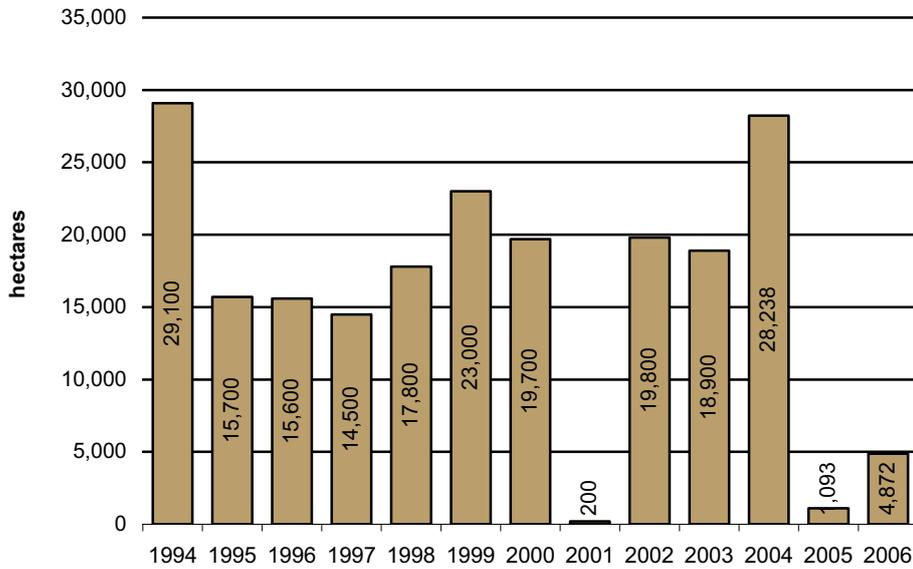
PROVINCE	Production 2005 (mt)	Production 2006 (mt)	Change 2005-2006 (mt)	Change 2005-2006 (%)
Nuristan	68	41	-27	-40%
Kunar	47	44	-3	-6%
Laghman	12	30	18	150%
Kapisa	5	10	5	100%
Nangarhar	48	179	131	273%
Eastern Region	180	304	124	69%

Nangarhar

Opium poppy cultivation in Nangarhar increased by 346% from 1,093 ha in 2005 to 4,872 ha in 2006. Nangarhar was almost opium poppy free in 2005, with the exception of districts along the Afghan-Pakistan border and far from the centre of the province such as Shinwar, Achin, and Nazyana, which resumed opium cultivation in 2006. Some limited cultivation was also observed in Batikot district, which is close to the province centre.

Opium production increased by 273% and reached 179 mt in 2006. The total amount of eradication was estimated at 337 ha, which is much less than in 2005 (1,860 ha) due to the security problems in the opium poppy cultivating areas.

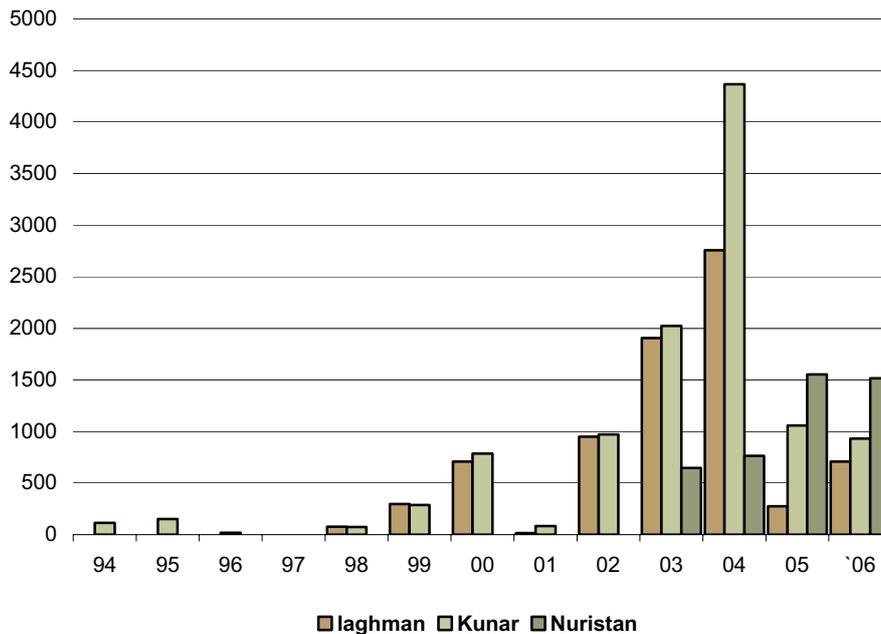
Figure 14: Opium poppy cultivation in Nangarhar province (hectares), 1994 - 2006



Laghman, Kunar, Nuristan

Opium poppy cultivation in Laghman increased by 159% and reached 710 ha, which is still much lower than the 2004 level of 2,756 ha. Cultivation decreased in both Kunar (-12%) and in Nuristan provinces in 2006 (-3%). The area under opium poppy cultivation amounted to 932 ha in Kunar and 1,516 ha in Nuristan. Opium poppy cultivation in all these three provinces is located in remote and mountainous areas where security is not very good.

Figure 15: Opium poppy cultivation in Laghman, Kunar and Nuristan provinces (hectares), 1994 - 2006



NORTH-EASTERN REGION (Badakhshan, Takhar)

Opium poppy cultivation in the North-eastern region again reached the 2004 level after the successful decrease in 2005. Opium poppy cultivation amounted to 15,234 ha, an increase by 74%, in 2006. Opium production also increased by 62% and reached 590 mt, which is equivalent to 10% of the total production in Afghanistan in 2006.

Table 12: Opium poppy cultivation and eradication in the North-Eastern Region (hectares), 2004 - 2006

PROVINCE	Cultivation 2004 (ha)	Cultivation 2005 (ha)	Cultivation 2006 (ha)	Change 2005-2006 (ha)	Change 2005-2006 (%)	Estimated total area of eradication (ha) 2005	Estimated total area of eradication (ha) 2006
Badakhshan	15,607	7,370	13,056	5,686	77%	144	921
Takhar	762	1,364	2,178	814	60%	100	35
North Eastern Region	16,369	8,734	15,234	6,500	74%	244	956

Table 13: Opium production in the North-Eastern Region (metric tons), 2005 - 2006

PROVINCE	Production 2005 (mt)	Production 2006 (mt)	Change 2005-2006 (mt)	Change 2005-2006 (%)
Badakhshan	308	503	195	63%
Takhar	57	87	30	53%
North Eastern Region	365	590	225	62%

Badakhshan

Opium poppy cultivation in Badakhshan increased by 77% to 13,056 ha in 2006. The survey showed that opium poppy cultivation moved from the main irrigated valleys to rain-fed areas and side-valleys in 2006, a phenomenon that was already observed in 2005. Approximately 60% of the cultivation happened in rain-fed areas in 2006. Dareem and Argo valleys were the main opium poppy cultivation areas in 2006.

Due to the drought in rain-fed areas, production (63%) did not increase as much as cultivation in Badakhshan in 2006. Eradication was more intense compared to 2005 but, due to the bad road conditions, eradication teams could not reach the main opium poppy cultivated areas.

Figure 16: Opium poppy cultivation in Badakhshan province (hectares), 1994 - 2006

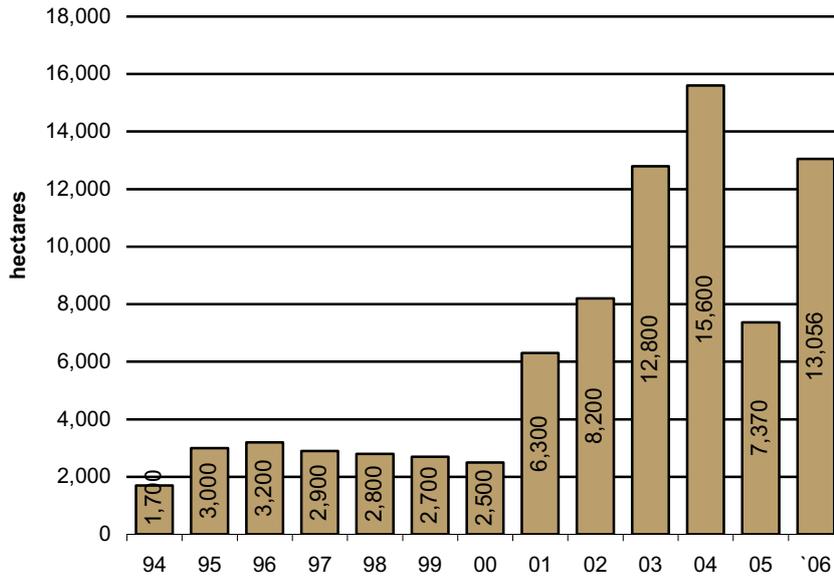
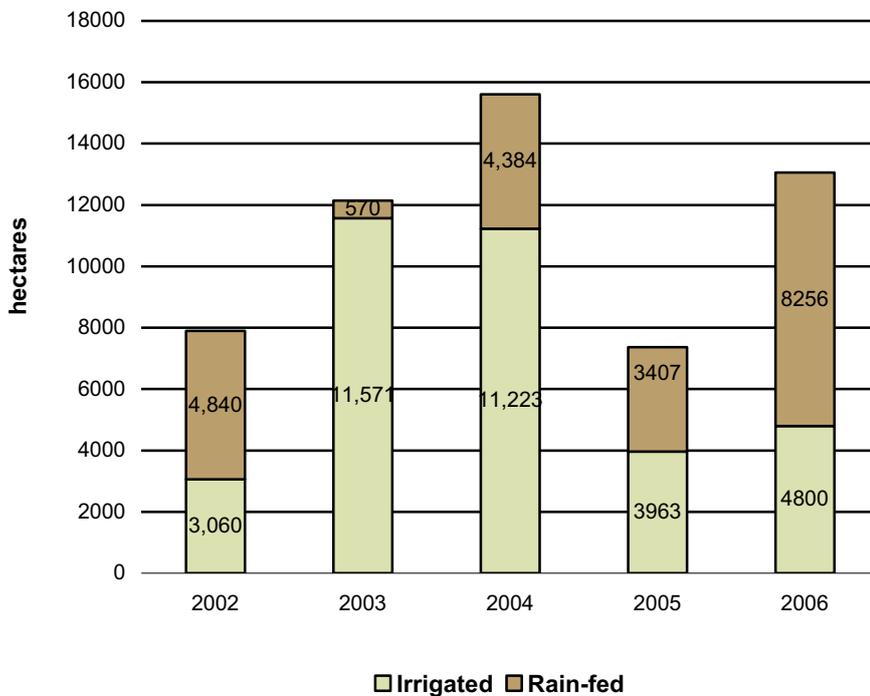
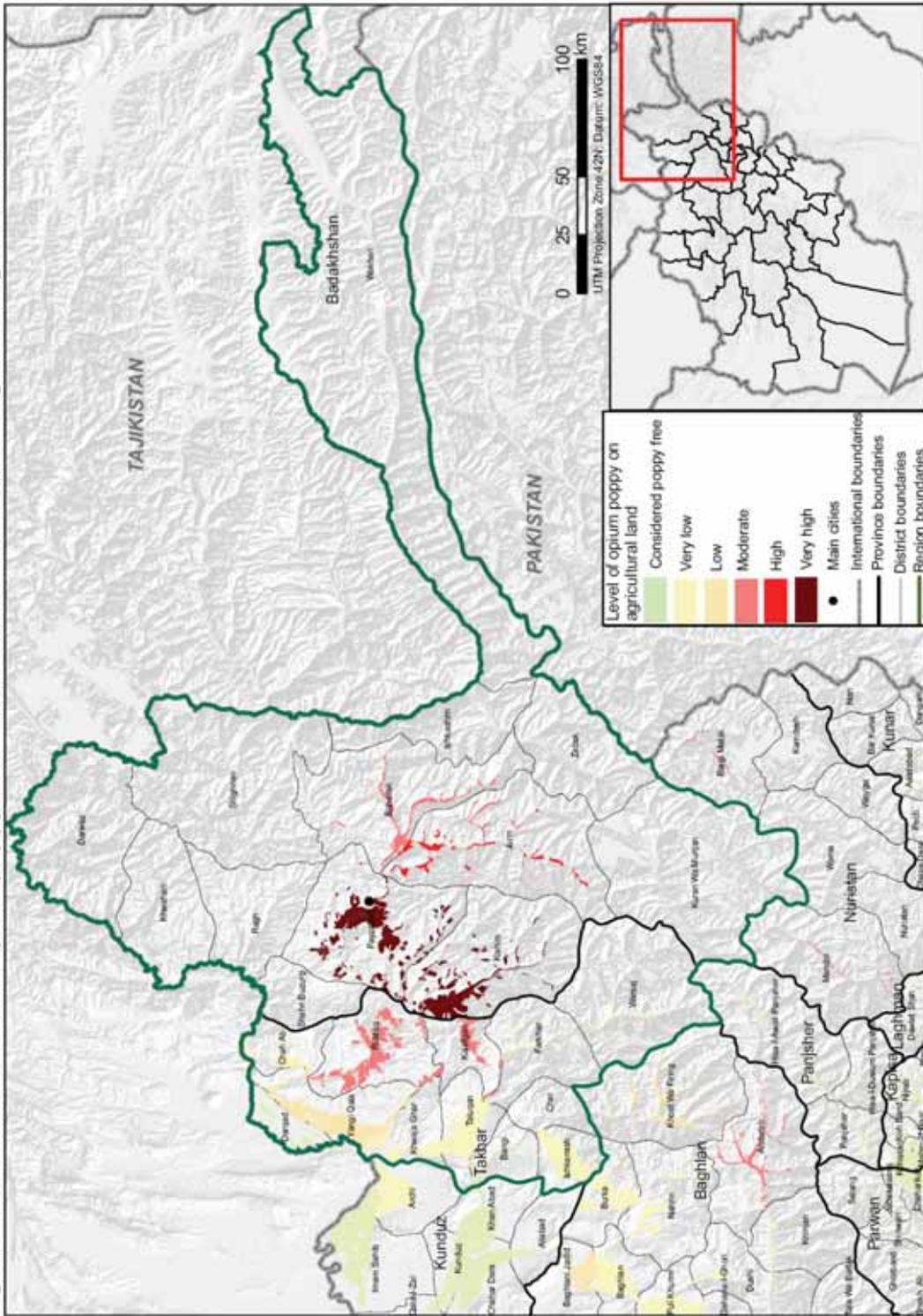


Figure 17: Distribution of irrigated and rain-fed poppy cultivation in Badakhshan (ha), 2002 – 2006



Agricultural land and level of opium poppy cultivation in the North Eastern region in Afghanistan, 2006



Source: MCN - UNODC Afghanistan Opium Survey 2006
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

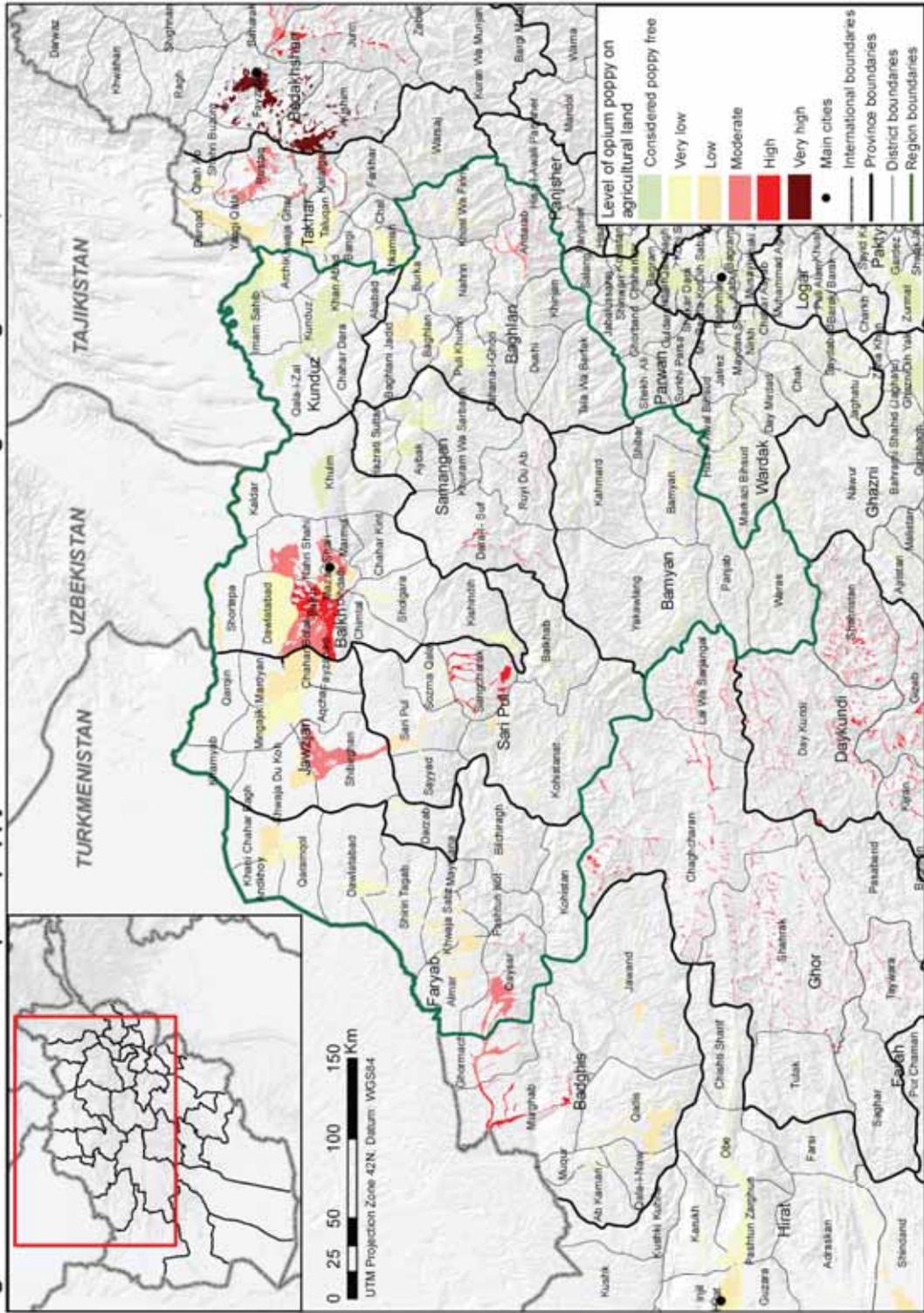


Opium poppy field in Badakhshan (Jurm district), June 2006

Takhar

In 2006, the total opium poppy cultivation in Takhar reached 2,178 ha, a 60% increase compared to 2005. Most of the opium poppy cultivation in 2005 took place in remote, rain-fed areas of this province.

Agricultural land and level of opium poppy cultivation in the Northern region in Afghanistan, 2006



Source: MCN - UNODC Afghanistan Opium Survey 2006
 Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

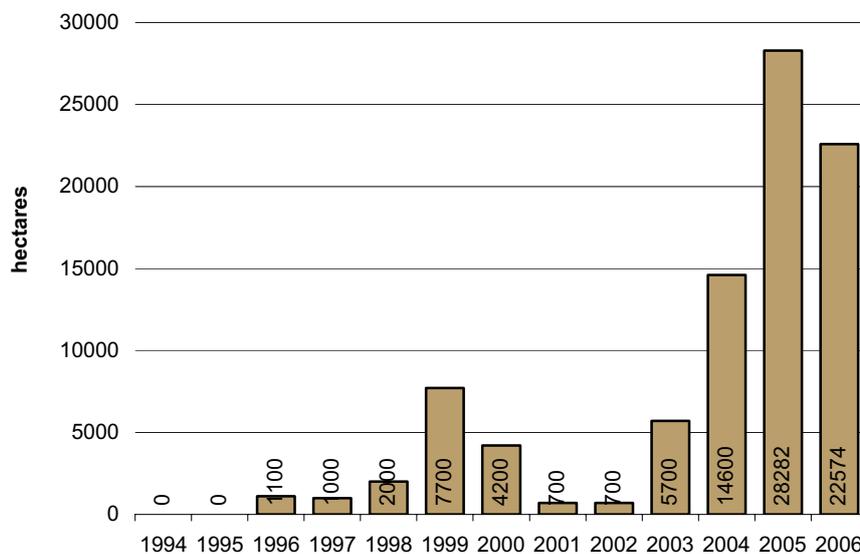
NORTHERN REGION (Faryab, Balkh, Sari Pul, Baghlan, Jawzjan, Badghis, Samangan, Bamyan, Kunduz)**Table 14: Opium poppy cultivation and eradication in the Northern Region (hectares), 2004 - 2006**

PROVINCE	Cultivation 2004 (ha)	Cultivation 2005 (ha)	Cultivation 2006 (ha)	Change 2005-2006 (ha)	Change 2005-2006 (%)	Estimated total area of eradication (ha) 2005	Estimated total area of eradication (ha) 2006
Badghis	614	2,967	3,205	238	8%	0	602
Baghlan	2,444	2,563	2,742	179	7%	63	22
Balkh	2,495	10,837	7,232	-3,605	-33%	840	2370
Bamyan	803	126	17	-109	-87%	0	0
Faryab	3,249	2,665	3,040	375	14%	0	264
Jawzjan	1,673	1,748	2,024	276	16%	0	48
Kunduz	224	275	102	-173	-63%	0	0
Samangan	1,151	3,874	1,960	-1,914	-49%	16	136
Sari Pul	1,974	3,227	2,252	-975	-30%	112	1981
Northern Region	14,627	28,282	22,574	-5,708	-20%	1,031	5,423

Table 15: Opium production in the Northern Region (metric tons), 2005 - 2006

PROVINCE	Production 2005 (mt)	Production 2006 (mt)	Change 2005-2006 (mt)	Change 2005-2006 (%)
Jawzjan	68	92	24	35%
Balkh	420	291	-129	-31%
Kunduz	11	4	-7	-64%
Faryab	103	162	59	57%
Samangan	150	81	-69	-46%
Baghlan	99	134	35	35%
Sari Pul	125	106	-19	-15%
Badghis	115	73	-42	-37%
Bamyan	5	0	-5	-100%
Northern Region	1098	945	-153	-14%

The percentage of opium poppy cultivation in the northern region of the total area under opium poppy cultivation in Afghanistan decreased from 27% in 2005 to 13% in 2006. The total amount of cultivation decreased from 28,282 ha in 2005 to 22,574 ha in 2006 (-20%). Cultivation in the region decreased for the first time in five years. Opium production also decreased by 14% and amounted to 945 mt, which is equivalent to 15% of the total opium production in Afghanistan in 2006. Eradication in the region was more intense compared to 2005 and increased from 1,031 ha (2005) to 5,423 ha in 2006.

Figure 18: Opium poppy cultivation in the Northern Region (hectares), 1994 - 2006**Balkh**

In Balkh, opium poppy cultivation in 2006 decreased by 33% to 7,232 ha. However, cultivation was still much higher compared to 2005. The total eradication carried out by the Governor was estimated at 2,370 ha in 2006. This indicates that the area originally planted with opium poppy in 2006 was almost the same as in 2005 and that eradication activities were responsible for the overall decrease.

Badghish

Opium poppy cultivation in Badghish has been increasing since 2002 and reached 3,205 ha in 2006 (8% increase). A total of 602 ha of eradication was carried out by the local Governor. Badghish is turning into an important opium poppy producing province judging from the significant increases after the year 2002 .

Faryab

Opium poppy cultivation level in Faryab stabilized at around 3,000 ha after the year 2002. Cultivation increased from 2,665 ha in 2005 to 3,040 ha in 2006 (14%). Eradication was not intense in this province neither in 2005 nor in 2006.

Samangan

In Samangan province, opium poppy decreased significantly (-49%) to 1,960 ha in 2006 from 3,874 ha in 2005. Eradication was also more intense than in 2005 and estimated as 136 ha.

Saripul

Similar to the development in Samangan province, opium poppy cultivation in Saripul decreased sharply by 30% to 2,252 ha in 2006. The local governor Saripul and the district authorities were very active in eradication in 2006, which was estimated at 1,981 ha (2006), compared to 112 ha in 2005. As in Balkh, the area of opium poppy planted was almost equal to the 2005 level and eradication was the main reason for the decrease in harvestable area.



Opium poppy cultivation in Balkh district, Balkh province (06 March 2006)



Opium poppy in Baghlan Province (26 April 2006)



Opium poppy in Mardyan district, Jawzjan Province (24 April 2006)



Opium poppy in Saripul district, Saripul Province (02 May 2006)

CENTRAL REGION (Parwan, Paktya, Wardak, Ghazni, Paktika, Khost, Kabul, Logar)

Although opium poppy cultivation increased by 218% in 2006, the total amount (337 ha) is still negligible. Opium poppy fields were mainly observed in Kabul, Khost and Parwan provinces, whereas Logar, Paktya, Panjshir, Wardak, Ghazni and Paktika provinces were opium poppy-free. No eradication was carried out in this region due to the negligible level of cultivation.

Table 16: Opium poppy cultivation and eradication in the Central Region (hectares), 2004 - 2006

PROVINCE	Cultivation 2004 (ha)	Cultivation 2005 (ha)	Cultivation 2006 (ha)	Change 2005-2006 (ha)	Change 2005-2006 (%)	Estimated total area of eradication (ha) 2005	Estimated total area of eradication (ha) 2006
Kabul	282	0	80	80	100%	0	0
Khost	838	0	133	133	100%	0	0
Logar	24	0	0	0	0%	0	0
Paktya	1,200	0	0	0	0%	0	0
Panjshir	0	0	0	0	0%	0	0
Parwan	1,310	0	124	124	100%	0	0
Wardak	1,017	106	0	-106	-100%	0	0
Ghazni	62	0	0	0	0%	0	0
Paktika	0	0	0	0	0%	0	0
Central Region	4,733	106	337	231	218%	0	0

Table 17: Opium production in the Central Region (metric tons), 2005 - 2006

PROVINCE	Production 2005 (mt)	Production 2006 (mt)	Change 2005-2006 (mt)	Change 2005-2006 (%)
Panjshir	0	0	0	0%
Parwan	0	3	3	0%
Kabul	0	2	2	0%
Wardak	4	0	-4	-100%
Logar	0	0	0	0%
Paktia	0	0	0	0%
Ghazni	0	0	0	0%
Khost	0	3	3	0%
Paktika	0	0	0	0%
Central Region	4	8	4	100%

WESTERN REGION (Ghor, Hirat, Farah, Nimroz)

Opium poppy cultivation remained at the same level in 2006 as in 2005 and amounted to 16,615 ha. However, due to the severe drought affecting the region, opium production decreased by 22% in 2006. Although only 4% of the cultivated area was eradicated, eradication increased compared to 2005.

Table 18: Opium poppy cultivation and eradication in the Western Region (hectares), 2004 - 2006

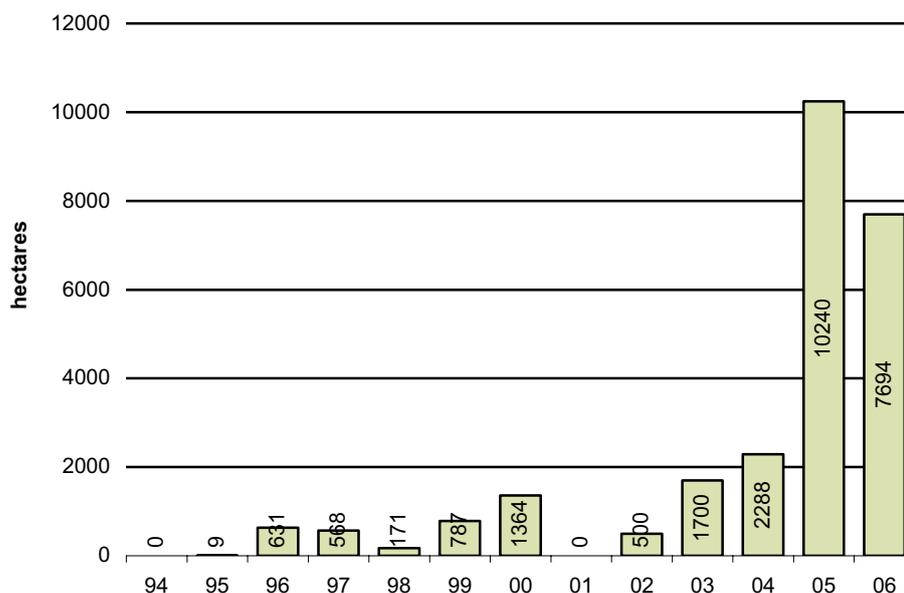
PROVINCE	Cultivation 2004 (ha)	Cultivation 2005 (ha)	Cultivation 2006 (ha)	Change 2005-2006 (ha)	Change 2005-2006 (%)	Estimated total area of eradication (ha) 2005	Estimated total area of eradication (ha) 2006
Farah	2,288	10,240	7,694	-2,546	-25%	86	562
Ghor	4,983	2,689	4,679	1,990	74%	0	0
Hirat	2,531	1,924	2,287	363	19%	156	113
Nimroz	115	1,690	1,955	265	16%	0	26
Western Region	9,917	16,543	16,615	72	0%	242	701

Table 19: Opium production in the Western Region (metric tons), 2005 - 2006

PROVINCE	Production 2005 (mt)	Production 2006 (mt)	Change 2005-2006 (mt)	Change 2005-2006 (%)
Herat	80	54	-26	-33%
Ghor	111	115	4	4%
Farah	424	297	-127	-30%
Nimroz	70	71	1	1%
Western Region	685	537	-148	-22%

Farah

Opium poppy cultivation in Farah has decreased by 25% from 10,240 ha in 2005 to 7,694 ha in 2006. Opium production decreased by 33% in Farah province. Due to the drought affecting the region, most of the cultivation failed. Eradication was more intense than last year but it was mainly carried out on failed opium poppy fields.

Figure 19: Opium poppy cultivation in Farah province (hectares), 1994 - 2006

Ghor

Cultivation increased by 74% from 2,689 ha in 2005 to 4,679 in 2006. There was no eradication in Ghor province in 2006.

Hirat and Nimroz

In Hirat (2,287 ha) and Nimroz (1,955 ha), opium poppy cultivation in 2006 remained at a similar level compared to 2005. Cultivation in Hirat province took mainly place in Shindad district where security is not good. In Nimroz province, little agricultural area is available for opium poppy cultivation and security was not very good in 2006, too.

2.2 Opium poppy cultivation density

The land potentially available for crop cultivation in Afghanistan amounts to 8.05 million hectares (FAO)², out of a total land area of 65 million hectares. The Afghan Ministry of Agriculture currently estimates the land under actual cultivation at around 4.55 million ha³. Based on these data, the area under opium poppy cultivation covered 3.65% of the total land used for agriculture in 2006, an increase from 2.3% in 2005.

Opium poppy cultivation density varies considerably from province to province. In Hilmand, the main opium producing province, one third of the agricultural land was covered with opium poppy, which was the highest density reached in 2006. In Uruzgan (18%), Day Kundi (17%), Kandahar (10%) and Farah (9%) provinces, opium poppy cultivation density was much lower but still

5 <http://faostat.fao.org/faostat/collections?version=ext&hasbulk=0&subset=agriculture>

6 <http://www.agriculture.gov.af/agriculture.htm>

relatively high, while in Nangarhar and Faryab, just 5% and 2% respectively of the agricultural land was covered by opium poppy.

2.3 Cannabis cultivation

UNODC surveyors collected information on cannabis cultivation through direct observation and through interviews with district/village elders during the annual opium survey. This information must thus be treated with caution as the survey was not designed to verify the extent of cannabis cultivation. In order to get more detailed information on the level cannabis cultivation in Afghanistan, a survey would need to be done during the cannabis cultivation period (June-September).

Around 50,000 ha of cannabis cultivation was estimated in Afghanistan in 2006 compared to 30,000 ha in 2005. The information obtained from the field showed that, in 2006, cannabis cultivation increased sharply especially in the southern provinces and some parts of Nangarhar and Paktya.

2.4 Opium Yield

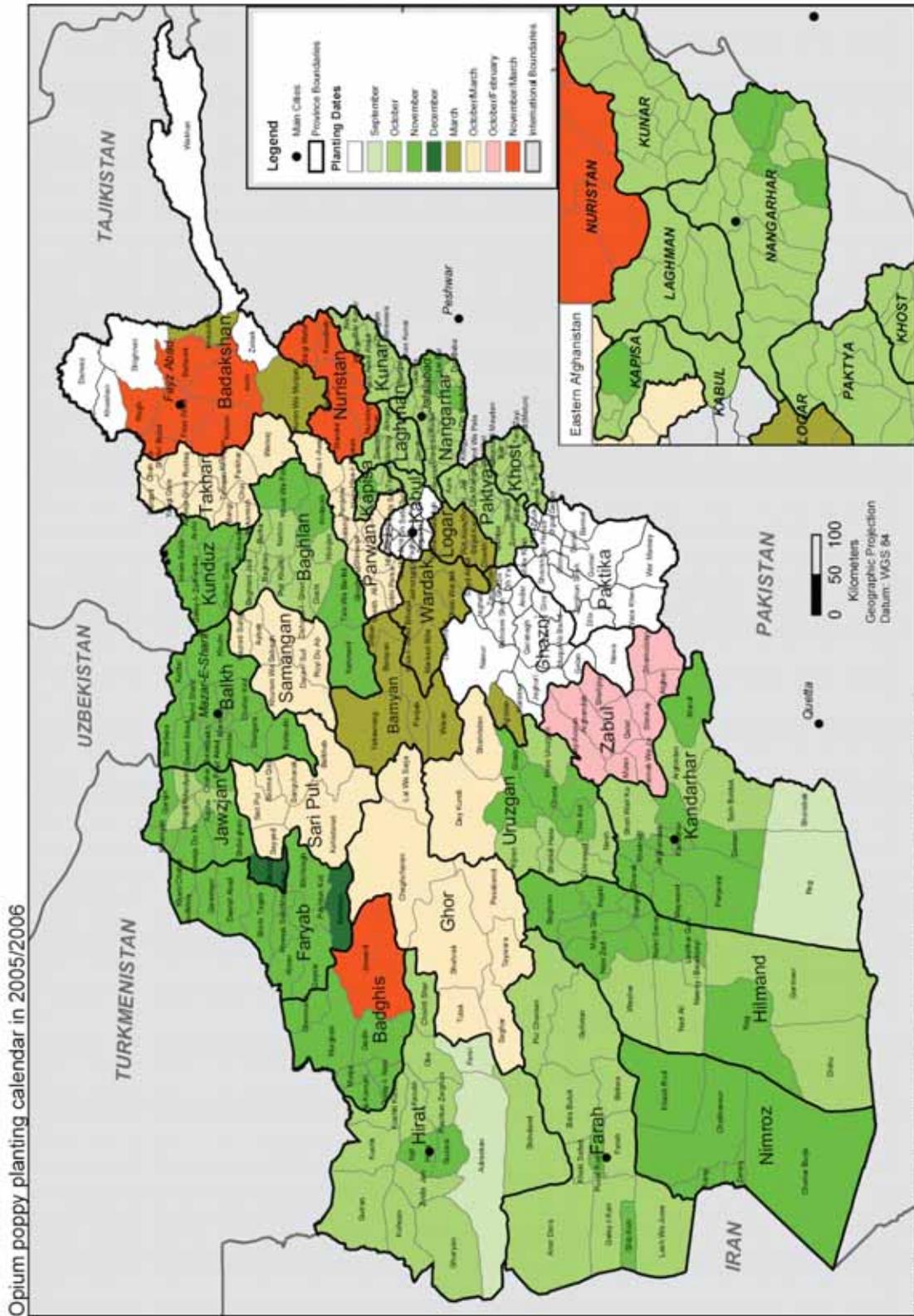
In 2006, the average dry opium yield in Afghanistan, weighted by cultivation area, was estimated at 37 kg/ha (confidence interval: 36-38 kg/ha). The largest declines were found in the Central and Western Regions where farmers reported losses due to drought.

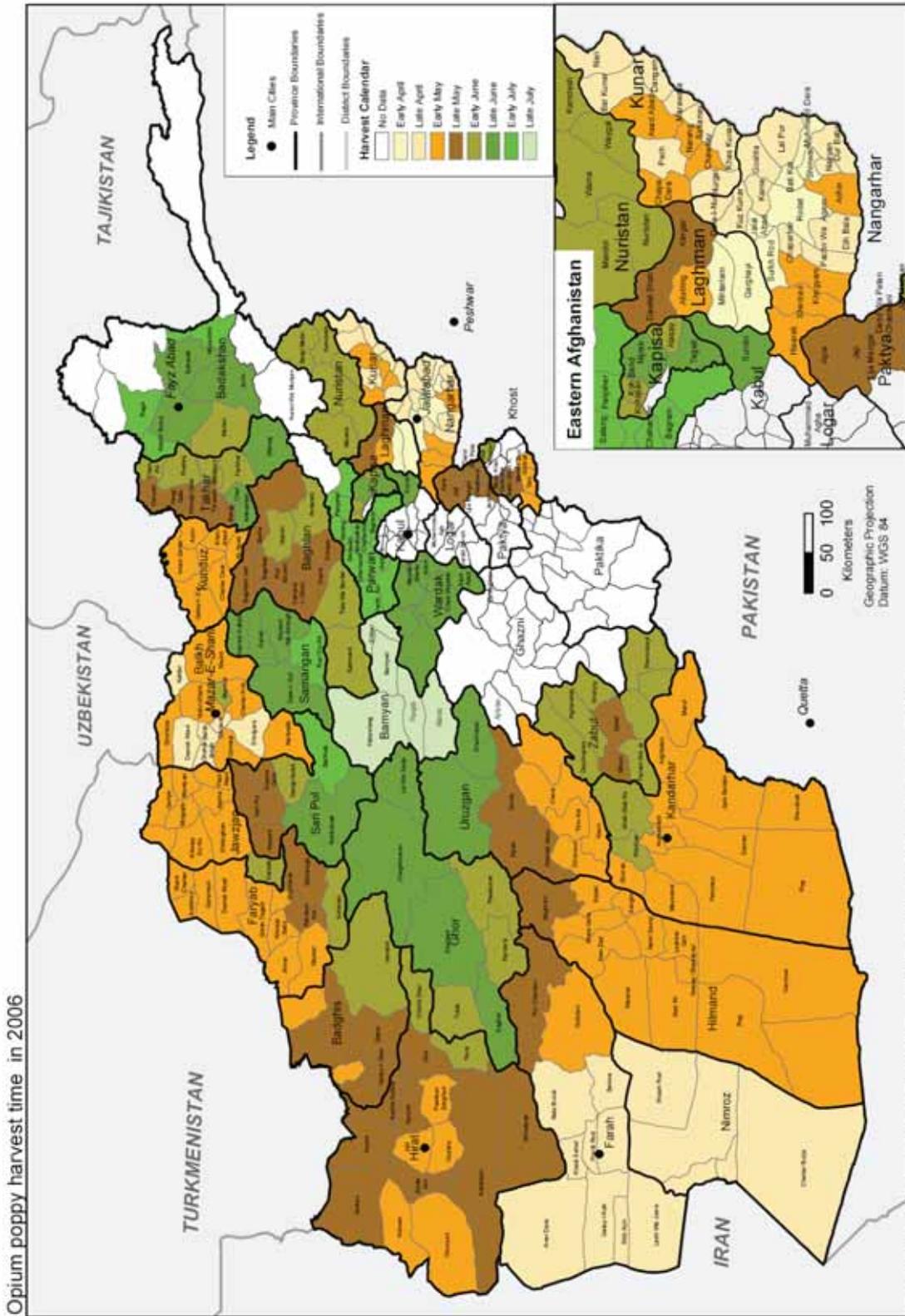
The results of the yield survey were confirmed by the village survey (1,554 villages visited), which found similar yield figures based on farmer reports.

Table 20: Opium yield by region in 2005 and 2006 (kg/ha)

Region	2005 Average Yield (kg/ha)	2006 Average Yield (kg/ha)	Change
Central (Parwan, Paktya, Wardak, Khost, Kabul, Logar, Ghazni, Paktika)	36.1	23.3	-35%
Eastern (Nangarhar, Kunar, Laghman, Nuristan, Kapisa)	44	36.6	-17%
North-Eastern (Badakhshan, Takhar)	41.8	38.7	-7%
Northern (Bamyan, Jawzjan, Sari Pul, Baghlan, Faryab, Balkh, Samangan, Badghis, Kunduz)	38.8	41.8	8%
Southern (Hilmand, Uruzgan, Kandahar, Zabul)	37.9	36.3	-4%
Western (Ghor, Hirat, Farh, Nimroz)	41.4	32.3	-22%
National average *	39.3	37.0	-6%
*Weighted average			

The sample for the yield survey tripled in 2006. A total of 25,325 opium poppy capsules were measured in 320 villages visited. In 2006, surveyors selected 3 opium poppy fields in each visited sample villages, one field of poor quality, one of medium and one of good quality, instead of only one field per village as in previous surveys. This measure helped to avoid any possible tendency of the surveyors to always select fields of a certain quality, and improved the sample distribution. It should be noted that "field quality" here refers to a relative quality of a field compared to other fields in a village, not to any absolute, quantifiable quality.





Lancing

Lancing is the incision of the opium capsules during harvest with a sharp instrument, a process, which causes the opium latex to ooze out. The number of lancing of opium poppy capsules was minimal in Uruzgan (2 times), due to the drought problems in 2006, while it had been 4 in 2005. At the country level, opium poppy fields were lanced 4 times on average in 2006, compared to 5 times in 2005. The highest number of lancing was observed (6 times) in Kabul, Kunar, and Nangarhar provinces.

Table 21: Average number of opium poppy capsule lancing, 2006

Province	Number of Lancing
BADAKHSHAN	4
BADGHIS	3
BAGHLAN	3
BALKH	4
FARAH	4
FARYAB	4
GHOR	3
HILMAND	3
HIRAT	3
JAWZJAN	4
KABUL	6
KANDAHAR	4
KAPISA	5
KHOST	5
KUNAR	6
KUNDUZ	5
LAGHMAN	5
NANGARHAR	6
NIMROZ	3
NURISTAN	5
SAMANGAN	4
SARI PUL	4
TAKHAR	5
URUZGAN	2
ZABUL	3
Overall	4

Harvest conditions

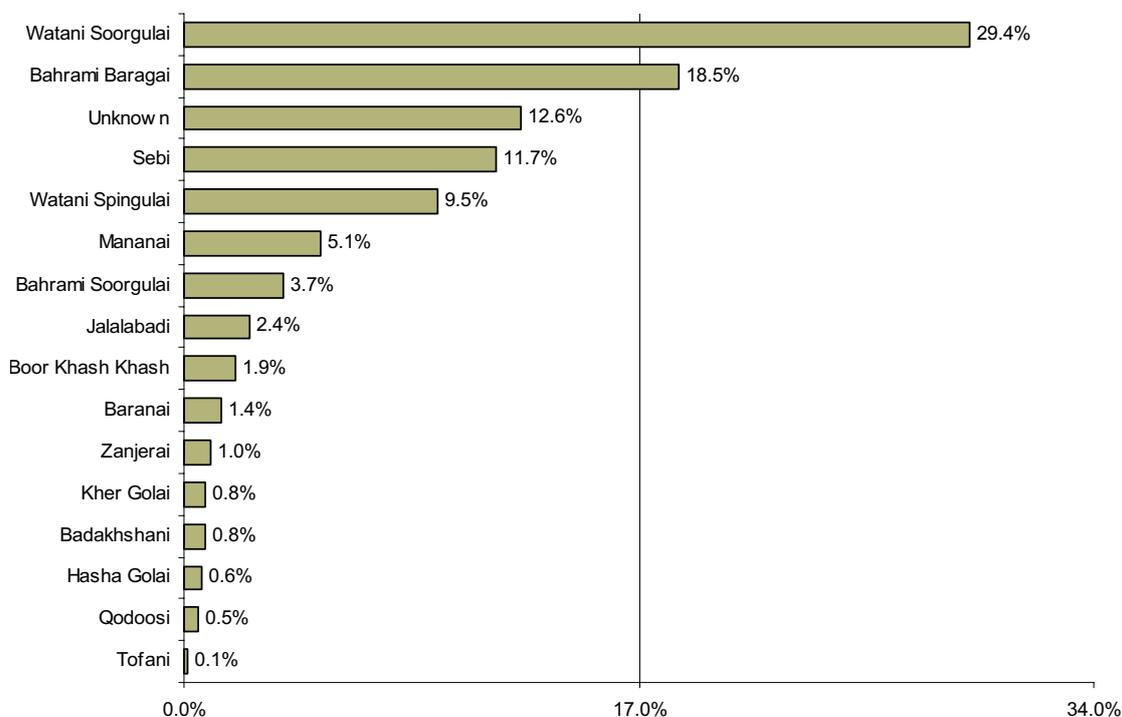
During harvest time, farmers in Southern and Northern Afghanistan farmers reported a shortage of agricultural labourers to help with the lancing. Northern and southern farmers also reported rushed harvesting because of fear of eradication. In the Western, North Eastern and Eastern regions, farmers did not report any problem during the harvesting time.

Opium poppy varieties

During the yield survey, information was collected in 320 villages on opium poppy varieties planted by the farmers. Different varieties can vary in many aspects such as: appropriate soils, maturation date, resistance to diseases, need for inputs like water, fertilizer, labour requirements, etc. In 2006, a larger number of opium poppy varieties were observed than in 2005. Most farmers (29.4%) still preferred the *Watani Soorgulai* variety, however, their proportion was much lower than in 2005 (42%). The second most frequently variety (18%) planted in 2006 was *Watani Spingulai*, closely followed by *Bahrami Soorgulai* (15%). Some farmers, mainly in Northern and North Eastern Afghanistan where farmers had started to cultivate opium poppy only recently, did not know which variety they had planted.

Southern farmers mainly preferred *Watani Soorgulai* (31%), *Sebi* (22%) and *Bahrami Baragai* (13%) whereas Eastern farmers preferred *Bahrami Baragai* (45%) and *Watani Soorgulai* (30%) and did not prefer *Sebi* variety at all. 73% of the Central Afghanistan farmers preferred *Watani Spingulai*.

Figure 20: Opium poppy varieties in Afghanistan, 2006



The flower of *Watani Soorgulai* is generally pink, red or red and white. It is reported to mature later than the *Watani Spingulai* variety and it typically has small capsules making it harder to lance and thus requiring more labour. Farmers reported that *Watani Soorgulai* produces good quality opium with low moisture content, but that the yield is low in comparison to other varieties.



Watani Soorgulai

Watani Spingulai has a white flower and was found to be grown on both sandy and clay loam soils. The capsules of *Spingulai* are more elongated than those of other varieties. *Spingulai* is an early maturing variety of opium poppy that is relatively resistant to both disease and poor weather. It was also reported that *Spingulai* is a low input crop, and requires less fertilizer, irrigation and labour than other varieties.



Watani Spingulai

2.5 Eradication

In 2006, an estimated area of 15,300 ha of opium poppy fields was eradicated (with a confidence interval ranging from 14,130-16,060 ha). This is roughly 10% of the area under opium poppy cultivation in 2006, up from 5% of the cultivation area in 2005.

UNODC/MCN field surveyors visited nearly 1,400 villages in 19 provinces where opium poppy eradication was carried out by Governor-led eradication teams and verified 9,000 ha of eradicated opium poppy (>18,000 fields). Governors reported eradication in another 320 villages, which were not visited by the surveyors. Nationwide, Governors claimed 23,563 ha of eradication in at least 1,700 villages. The surveyors found that, on average, only 57% of these claims could be verified. Applying the average ratio between claimed and actual verified eradication over the total claims, it is estimated that 13,050 hectares were eradicated across Afghanistan in Governor-led eradication programs (4,000 ha in 2005). Nearly 80% of the 2006 eradication took place in four provinces: Hilmand (24%), Kandahar (22%), Balkh (18%) and Sari Pul (15%). A further 2,250 ha of opium poppy fields were eradicated by the Afghanistan Eradication Force (AEF) in Hilmand and Badakshan (210 ha in 2005)⁴.

Overall, two thirds of cultivated opium poppy area in each village was left standing after eradication teams had carried out their activities, though there was a considerable regional variation. In Baghlan, Day Kundi, Faryab, Laghman, Nuristan, Samangan and Sari Pul less than 20% of the cultivated poppy remained after eradication, while in Farah, Hilmand, Hirat, Jawzjan, Nangarhar and Nimroz, the eradication teams left 80% or more of the cultivated area untouched. This seems to confirm reports from those provinces that farmers and eradication teams reached agreements on where and how much eradication would take place in a village.

The eradication verification survey was designed to measure how much of the total area claimed by governors as eradicated in each province was actually eradicated on the ground as well as to estimate the total eradicated area in the country. A fully successful eradication campaign would have the effect that no opium poppy reaches harvesting stage. The surveyors only took into account actually eradicated areas of opium poppy fields, where eradication activities would lead to a significant reduction or complete loss of the opium harvest, and considered only fields where harvest had not yet started. The verified eradicated area can be compared with the area under opium poppy cultivation in each province to understand how much more eradication would have been needed to reduce or completely eliminate opium poppy cultivation there. In addition, the comparison between the claimed eradicated area and the verified eradicated area gives an idea on how realistic and/or complete the eradication reports from provincial governors were.

The survey results allowed also determining the percentage of opium poppy left standing at the village level after eradication teams had visited an area. Whether or not all or only some fields in a certain area were subject to eradication depended among other things on the accessibility of the fields and the commitment of the eradication teams to carry out their work. Further, some farmers employed techniques to avert eradication, such as watering fields immediately before eradication teams arrived or claiming that there were Improvised Explosive Devices (IED) in fields. The comparison of the actually eradicated areas with the opium poppy left standing in a village allows interesting insights into the differences in eradication intensity in different parts of the country.

⁴ UNODC/MCN did not verify AEF eradication.

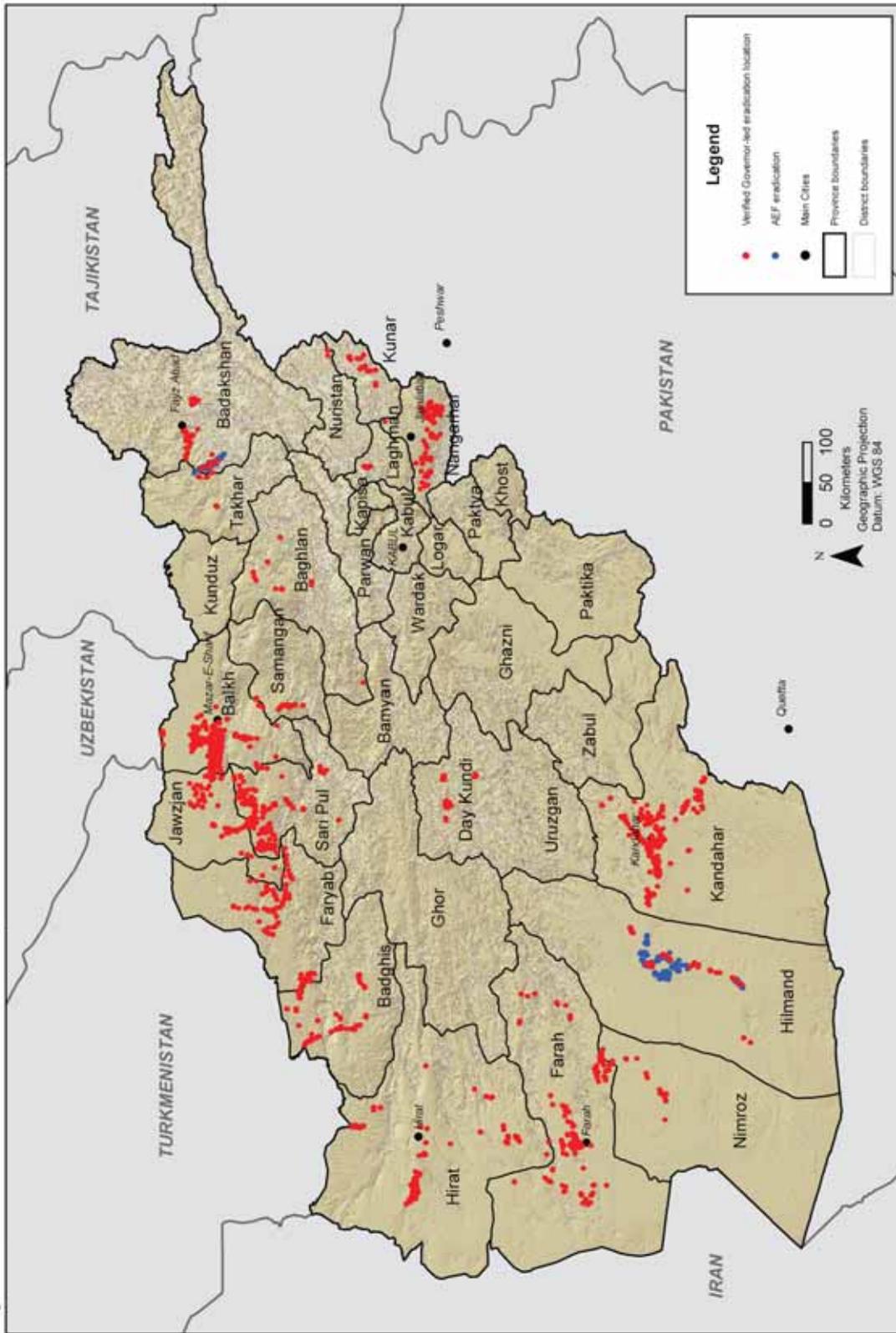
Table 22: Total Governor-led eradication estimation, 2006

Province	No of villages from Governors lists visited	Area of eradication in surveyed villages reported by Governors (ha)	% of Governors claims visited by surveyors	Sum of Surveyed area of eradication (ha)	% match between surveyor and Governor report	% of opium poppy eradicated in surveyed villages	Estimated total area of eradication	% of estimated area of eradication
Badakhshan	46	314	53	252	80	31	473	4
Badghis	49	1,291	91	547	42	59	602	5
Baghlan	12	53	23	5	9	83	22	<1
Balkh	258	3,502	80	1,906	54	42	2,370	18
Day Kundi	35	35	100	28	80	79	28	<1
Farah	118	1,089	80	451	41	21	562	4
Faryab	76	381	100	264	69	78	264	2
Hilmand	33	3,469	47	1,482	43	19	3,166	24
Hirat	84	183	65	74	40	23	113	1
Jawzjan	52	170	84	40	24	22	48	<1
Kandahar	240	2,673	66	1,880	70	45	2,829	22
Kunar	22	38	30	13	34	66	44	<1
Laghman	8	11	88	8	71	100	9	<1
Nangarhar	108	478	82	277	58	22	337	3
Nimroz	14	102	64	17	16	8	26	<1
Nuristan	3	6	100	5	90	99	5	<1
Samangan	22	282	100	136	48	83	136	1
Sari Pul	186	1,590	80	1,580	99	79	1,981	15
Takhar	10	114	92	32	28	30	35	<1
Total	1,376	15,780	67%	8,996	57%	36%	13,051	100%

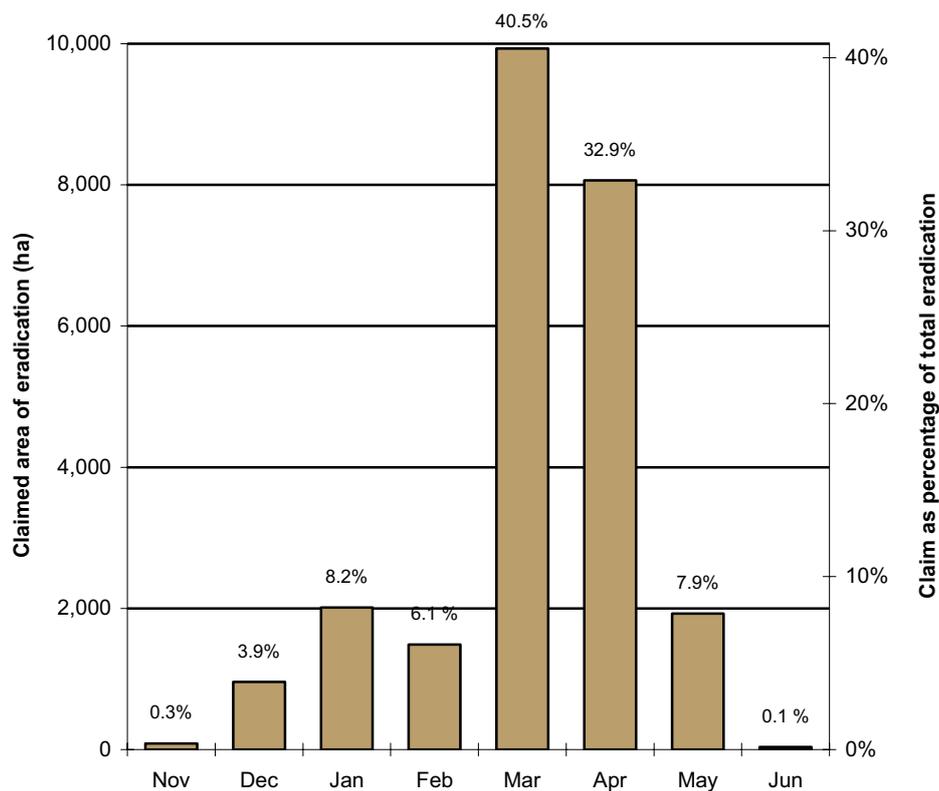
Table 23: Total AEF eradication, 2006

Province	Eradication (ha)
Badakhshan	448
Hilmand	1,807
Total	2,255

Afghanistan: Verified Eradication Locations, 2006



Source: ICN - UNODC 2006 Afghanistan Eradication Survey 2006
 Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

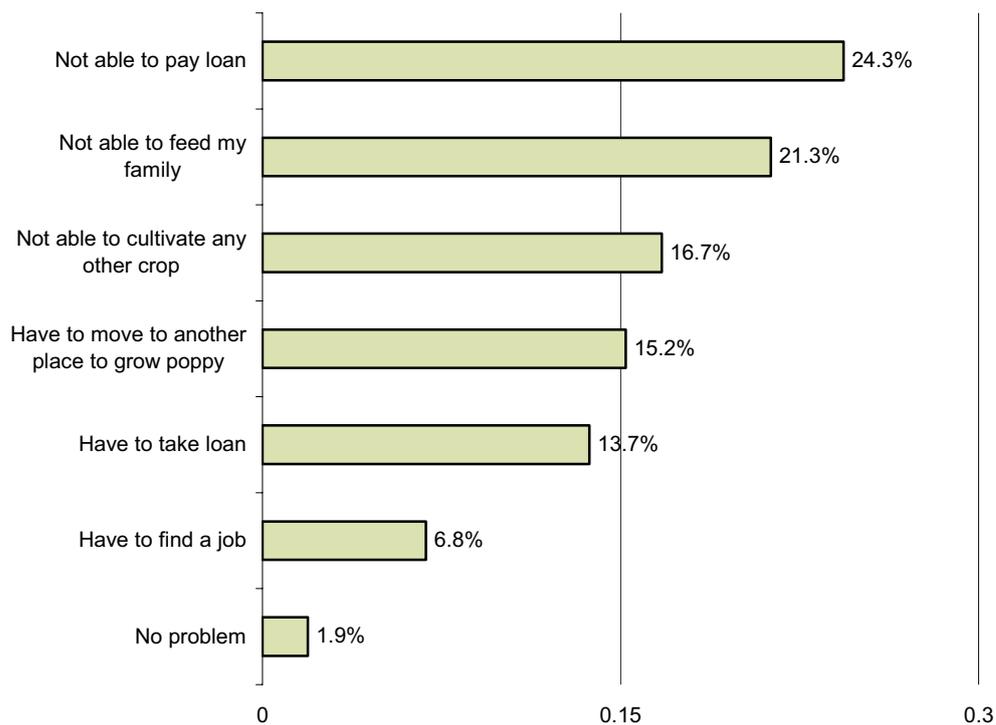
Figure 21: Timing of eradication and percentage of eradication per month, 2006

During the annual opium survey, 264 farmers (total sample: 1,554) reported eradication in their fields. The majority of the farmers (82%) who did not have any fields eradicated, reported that they intended to cultivate opium poppy in 2007, while only 44% of the farmers who had (part of) their fields eradicated in 2006, were planning to continue. When asked about the impact of eradication, 24% of the farmers reported that they were not able to pay back their loan and 21% said that they could not feed the family.

Table 24: Relation between eradication and planned opium poppy cultivation in 2007

Eradication of fields in 2006	Planning to cultivate opium poppy in 2007	
	No	Yes
No	16%	82%
Yes	56%	44%

Figure 22: Problems reported by farmers after eradication (n=264 farmers)



Problems encountered in the 2006 verification survey included:

- Governors providing names of districts where eradication took place without giving village names or area of eradication.
- Difficulties in surveyors locating eradicated villages. Often this is related to changes in district boundaries, leading to surveyors looking in the wrong areas for eradicated villages.
- A single village name being given but in fact eradication also occurred in numerous surrounding villages.
- The security situation in some districts was too unstable for surveyors to visit.
- Towards the end of the opium poppy growing season, large areas of eradication occurred on fields in different stages of harvest (partially or fully harvested). These fields were not included in the final estimates of eradication.

Eradication of the 2006 opium poppy crop began in some provinces as early as November and December 2005 and continued through to June 2006. This occasionally led to the situation of farmers having sufficient time following eradication to re-sow the eradicated fields with opium poppy, but generally farmers sowed fields with alternative crops following opium poppy eradication.

Figure 23: Timing of eradication in 19 provinces (dark green = effective eradication, light green = eradication of already harvested fields)

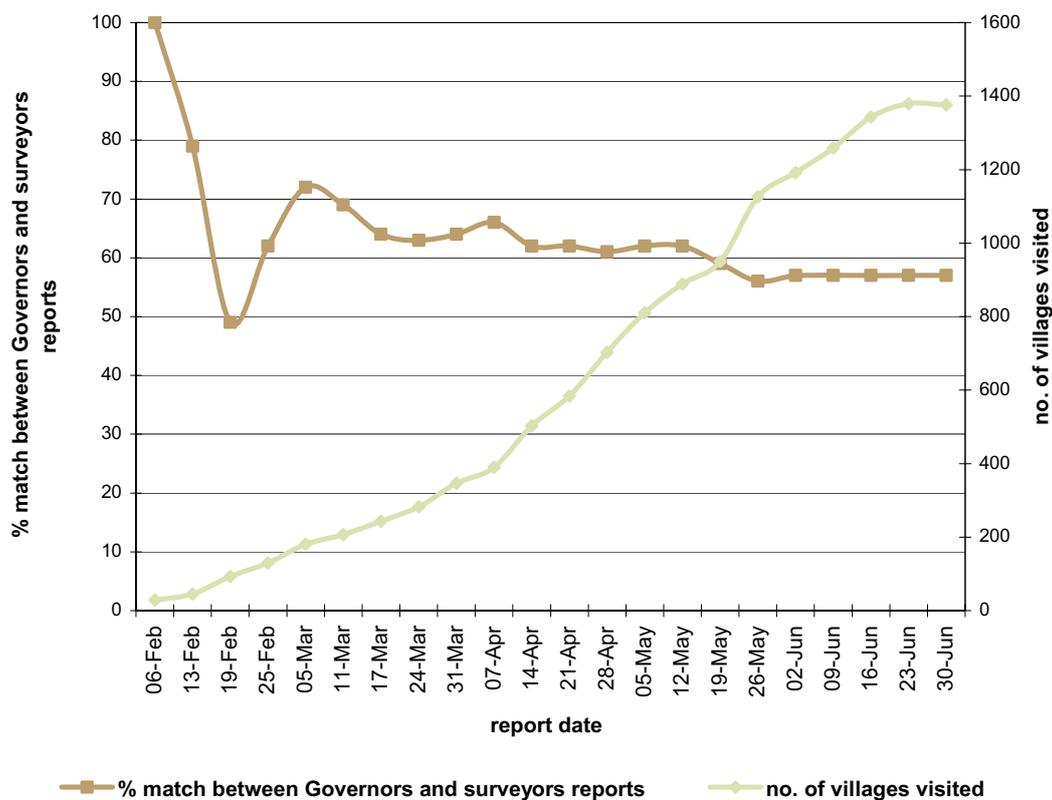
Province	November	December	January	February	March	April	May	June
Badakshan						Dark Green	Dark Green	Light Green
Badghis			Dark Green					
Baghlan						Dark Green	Dark Green	Light Green
Balkh	Dark Green							
Day Kundi							Dark Green	
Farah			Dark Green	Dark Green	Dark Green	Dark Green		
Faryab						Dark Green	Dark Green	Light Green
Hilmand					Dark Green	Dark Green		
Hirat				Dark Green	Dark Green	Dark Green	Dark Green	
Jawzjan					Dark Green	Dark Green	Dark Green	
Kandahar			Dark Green					
Kunar	Dark Green	Dark Green	Dark Green	Dark Green		Dark Green	Dark Green	
Laghman			Dark Green					
Nangarhar		Dark Green						
Nimroz						Dark Green	Dark Green	
Nuristan					Dark Green			
Samangan		Dark Green	Light Green					
Sari Pul			Dark Green	Light Green				
Takhar							Dark Green	

Over 70% of poppy eradication occurred in March and April 2006, generally at late cabbage to stem elongation stages of the poppy growth cycle. Eradicating this late ensures that farmers are unable to sow another crop of opium poppy during the same season, but it also has the effect that farmers cannot grow successfully a summer cereal crop. During the cultivation survey, UNODC/MCN surveyors interviewed opium poppy cultivating farmers in 1,554 villages. Surveyors interviewed 264 farmers who had eradication in their fields. Only 2% of them were able to re-grow opium poppy after the eradication. 38% of them grew wheat and 40% cultivated vegetable after eradication.

Governors claimed eradication in at least 1,719 villages nationwide. UNODC/MCN surveyors visited 1,376 of these villages from 1 February to 23 June 2006, where 67% of eradication was claimed to have occurred. The survey design did not require all villages where eradication was reported to be visited in order to accurately assess the level of opium poppy eradication in Afghanistan.

A total of 23,563 ha of eradicated opium poppy fields were reported by the Governors. UNODC/MCN surveyors visited villages with 15,780 ha of eradication claims, i.e. 67% of all claims were visited. However, only 8,996 ha of eradicated area was observed in these villages.

Surveyors verified approximately 57% of Governors' claims (8,996 ha/15,780 ha). This match ratio varied little since the middle of March when the match was approximately 63% after only 15% of eradicated villages had been visited. It was therefore also applied to claims for eradicated villages that UNODC/MCN surveyors were unable to visit.

Figure 24: Match between governors reports and surveyors observations

In 2006, UNODC/MCN surveyors spent approximately 5,500 man days visiting 1,376 villages where eradication was claimed. In these villages, surveyors collected details of over 18,000 fields where eradication took place.

While UNODC/MCN surveyor's estimates rarely matched Governors' claims it should not be assumed that Governor's claims were deliberately over-estimated. Measuring areas is a difficult skill, especially without adequate training and equipment. It is proposed that the members of Governor's eradication teams, who measure areas of eradication, should receive more training in surveying techniques, and have access to modern surveying equipment such as GPS.

Besides giving over-estimates on the area of eradication, a number of villages listed in Governor reports had no signs of eradication. Some of them had not cultivated opium poppy this year, while others had standing opium poppy fields without any evidence of eradication. Miscommunication between district administrations, who were implementing the eradication programs, and provincial administrations who were reporting to UNODC/MCN, were a likely reason for these problems.

Over 16,200 ha of standing opium poppy fields were observed in villages reported as having had eradication. It was estimated from ground surveys that on average only 36% of the area under opium poppy was eradicated in villages visited by Governor eradication teams, though there were significant differences between provinces as shown. In Baghlan, Day Kundi, Faryab, Laghman, Nuristan, Samangan and Sari Pul more than 80% of cultivated poppy was eradicated by Governor-led teams while in Farah, Hilmand, Hirat, Jawzjan, Nangarhar and Nimroz more than 80% of cultivated poppy remained standing after eradication.

The presence of standing poppy after eradication teams had visited villages, the absence of significant farmers' resistance to eradication, as well as widespread anecdotal evidence indicate that where and how much eradication took place was often decided by consensus between the

farmers and the eradication teams. As in 2005, there were many accounts of eradication teams accepting money from farmers who wanted to avert eradication.

The Afghanistan Eradication Force eradicated 1,807 ha of opium poppy fields in Hilmand and 456 ha in Badakshan, where their activities ceased in early June. This compares to 209 ha eradicated in 5 provinces by the Central Poppy Elimination Forces (CPEF) in 2005. AEF eradication was not verified by UNODC, but by international verifiers provided by the US Embassy in Kabul. The quality of the eradication carried out by AEF was generally of a much higher standard than Governor-led eradication, as well as the quality of their reports to UNODC.

Security incidents involving eradication teams were fewer this year than in 2005. AEF teams came under regular attack in Hilmand province during May, with up to three casualties suffered by anti-government elements during one incident. During May, a medical clinic in Badghish was attacked and five healthcare workers were killed. The doctor at the clinic was the brother of the head of the local poppy eradication team, and the attack was claimed to be in response to opium poppy eradication activities. One opium poppy farmer was killed in June during eradication in Badakshan. It was reported that a local commander with large landholdings under opium poppy created the unrest to protect his fields from eradication. There were no reports of eradication teams being attacked in any other provinces, though eradication was often met with minor, local hostility. No UNODC/MCN surveyors reported any significant security incidents directly aimed at them, even though they carried out their work in many isolated, instable regions.

Eastern Region (Kunar, Laghman, Nangarhar & Nuristan)

Approximately 730 ha of eradication were claimed in the Eastern Region. UNODC/MCN surveyors visited 80% of all claims and recorded 303 ha of eradication. The final estimate for eradication in this Region is 395 ha.

The small area of eradication in the Eastern Region reflects the low level of opium poppy cultivation in this area rather than reluctance on the part of Governors to carry out eradication. Opium poppy in this region is also frequently grown in isolated valleys where government control is not strong.

Kunar was one of the provinces where cooperation between district/provincial administrations and UNODC/MCN surveyors was poor. Governors lists were often vague with few village names or inaccurate areas of eradication being provided. Laghman had little eradication, but little opium poppy cultivation was observed by surveyors outside of villages targeted by eradication. The Nangarhar Governor carried out eradication from December 2005 through to May 2006. While much of the eradication was effective some villages were revisited by eradication teams three times before all opium poppy was removed. Nuristan is not a significant opium poppy growing province. Most opium poppy is grown in extremely isolated valleys, which makes eradication difficult.

Southern Region (Day Kundi, Hilmand, Kandahar, Nimroz, Uruzgan & Zabul)

Nearly 50% (11,626 ha) of all Governors eradication claims were received from the Southern Region. Surveyors visited 54% of all claims and reported 3,454 ha of eradication. The final estimate of Governor-led eradication in this region is 6,049 ha. A further 1,807 ha of eradication was carried out by AEF in Hilmand.

Day Kundi did not begin eradication until mid-May and it was estimated that 28 ha of poppy eradication was carried out. Hilmand is estimated to have the largest area of Governor-led eradication of all provinces in 2006 (3,166 ha). Most of this eradication was in Dishu, Garmser and Reg districts, but extensive areas of opium poppy fields in central Hilmand were left untouched. On average only 20% of opium poppy was eradicated in the villages visited by Governor eradication teams. Extensive eradication was also estimated in Kandahar (2,829 ha), though it was more evenly distributed across districts than in Hilmand. Approximately 50% of poppy was eradicated in each village visited by Governor eradication teams, with very few opium poppy growing villages having 100% eradication. The Nimroz Governors office carried out a

small amount of eradication in April (26 ha). Traditionally, Nimroz was not a significant poppy growing province. No reports of eradication were received from either Uruzgan or Zabul. In Uruzgan it was claimed by the Governors office that an extensive opium poppy disease rendered eradication unnecessary.

Western Region (Farah, Ghor & Hirat)

Governors in the Western Region claimed 1,636 ha of eradication in 2006. UNODC/MCN surveyors visited 80% of all Governors claims (1,272 ha) and reported 525 ha of eradication. The 42% match between Governors claims and surveyors estimates was the lowest of all regions. The final estimate of eradication in the Western Region was 675 ha.

Governor-led eradication took place in Farah province from January to early April 2006, by which time it is estimated that 562 ha of opium poppy fields had been eradicated. In Hirat province, 113 ha of opium poppy fields were eradicated from February to late May. There were some difficulties getting accurate reports from the Hirat Governor as eradication was carried out by district level administrations and their reports to the Governor were often late and incomplete. No eradication reports were received from Ghor province.

Northern Region (Badghis, Baghlan, Balkh, Faryab, Jawzjan, Samangan, Sari Pul)

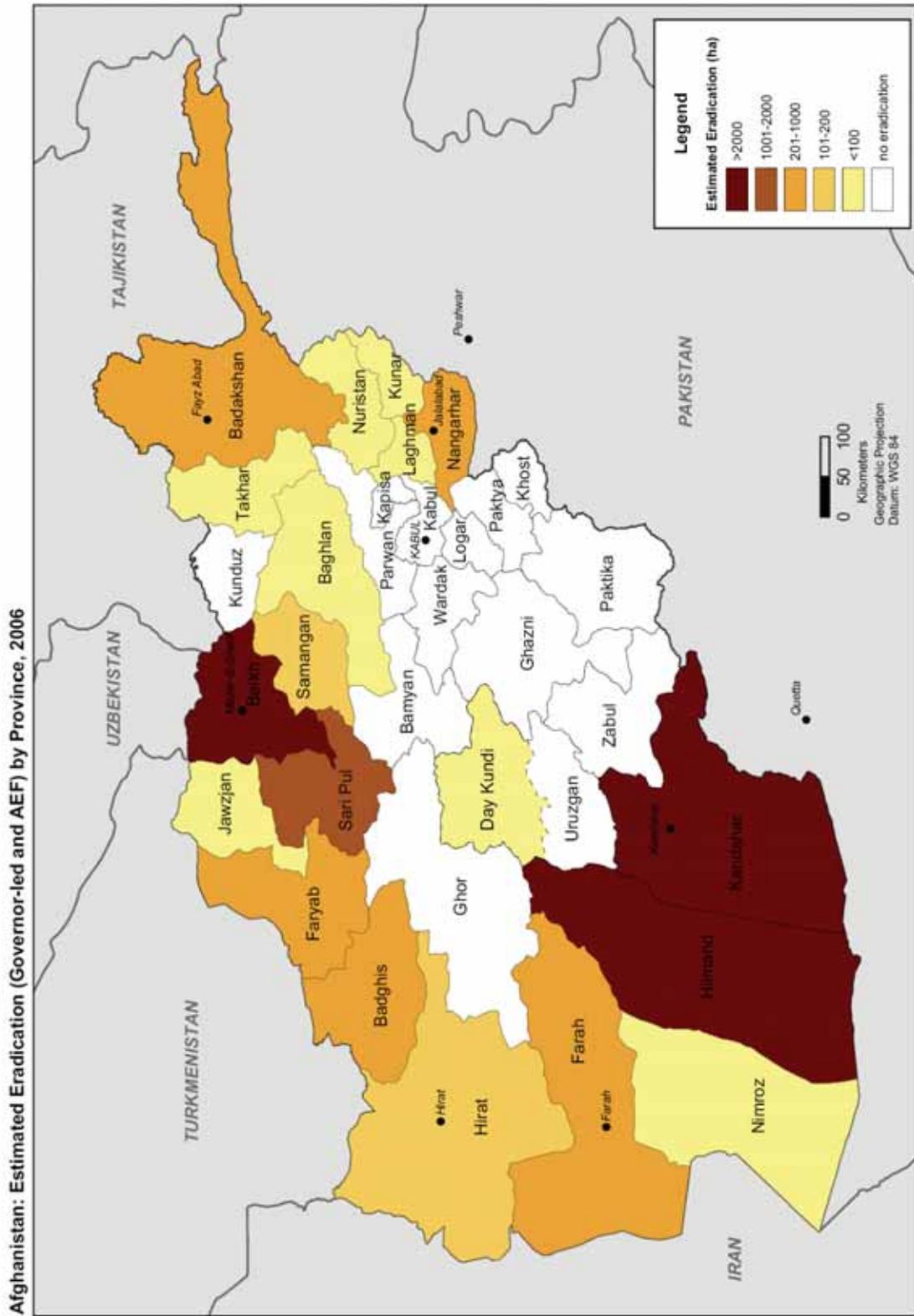
Approximately 40% (8,868 ha) of all Governor eradication claims were received from the Northern region. Surveyors visited villages where 82% (7,269 ha) of eradication was claimed and reported 4,478 ha of eradicated opium poppy fields. The final estimate of eradication in Northern Region is 5,423 ha, equal to 42% of all Governor-led eradication in 2006.

Sporadic eradication was carried out in Badghis province from January to April. In total, 602 ha of eradication was estimated for this province. The Baghlan Governor carried out an estimated area of 22 ha of eradication in April and May, though reports were received in June of eradication of harvested opium poppy fields. The Balkh Governor reported 4,355 ha of eradication from November 2005 through to April 2006. UNODC/MCN surveyors visited 80% of all claims and observed 1,906 ha of eradicated poppy fields. It is estimated that 2,370 ha of eradication was carried out in Balkh in 2006, 20% of national Governor-led eradication. Eradication teams under the supervision of the Governor of Faryab began eradication in mid-April and continued through to the end of May. A total of 381 ha of eradication were claimed. UNODC/MCN estimated that 264 ha of eradication took place in 2006. A further 300 ha were reported eradicated in June; UNODC/MCN surveyors visited a sample of this eradication and found that it was mostly on harvested fields. The Jawzjan Governor claimed 202 ha of eradication from March to May. Based on the reports of UNODC/MCN surveyors, it is estimated that 48 ha of eradication occurred. In Samangan, Governor-led eradication teams claimed 282 ha of eradication. Surveyors visited all these claims and reported 136 ha of eradication. In May, a report of nearly 800 ha of eradication was received from Samangan, but surveyors reported that all eradication in May was on harvested opium poppy fields. Approximately 2,000 ha of eradication were claimed in Sari Pul. Based on UNODC/MCN surveyors' reports from 80% of these claims, it is estimated that 1,981 ha of eradication took place in Sari Pul this year.

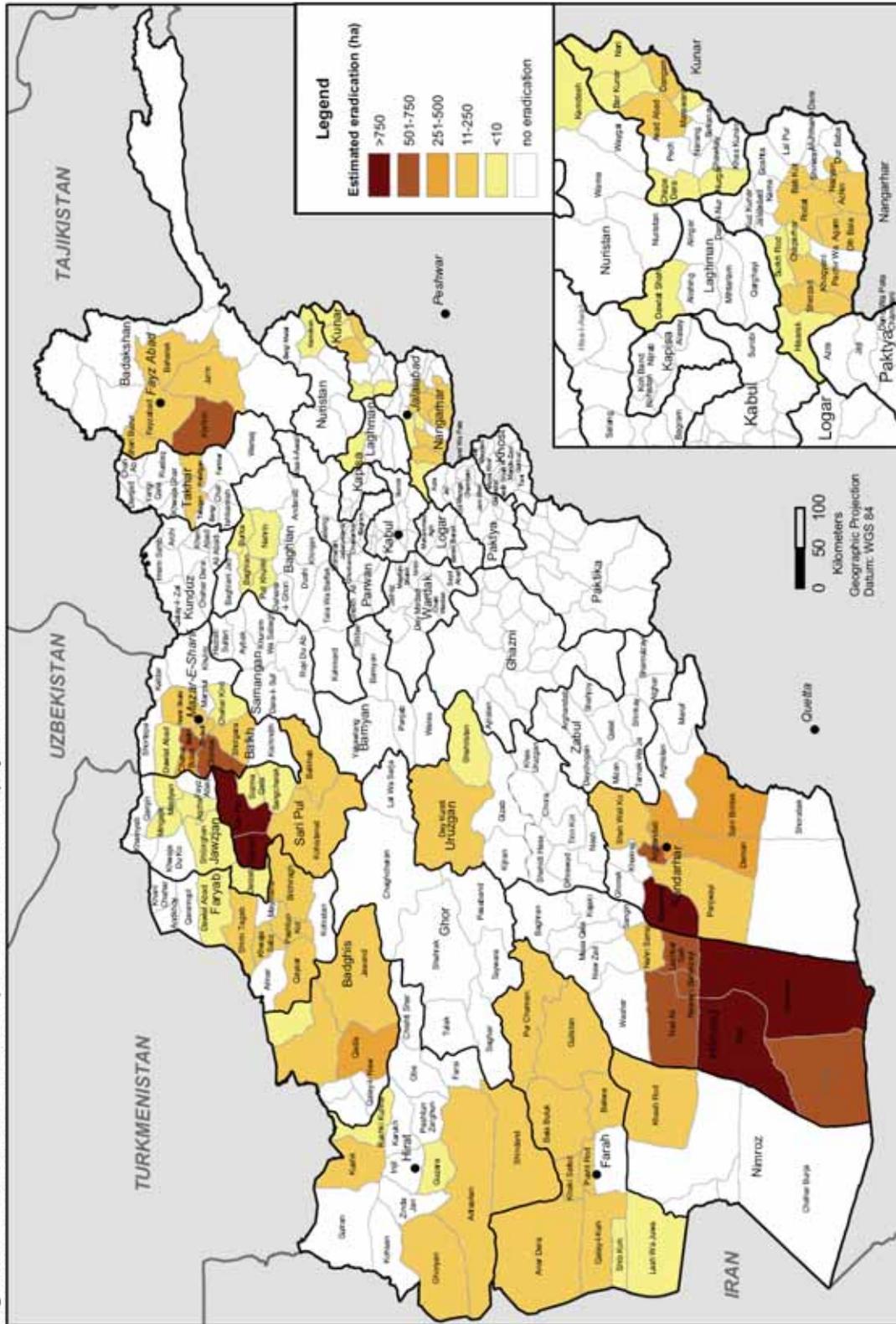
Northwest Region (Badakhshan & Takhar)

Governors in Northern Region claimed 713 ha of eradication in 2006. Based on UNODC/MCN surveyors' reports, a total area of 508 ha of eradication is estimated for 2006. A further 456 ha of eradication was reported by the AEF in Badakhshan.

Badakhshan eradication accounted for 94% (473 ha) of all Governor-led eradication in Northern Region. The eradication program began in early April and finished in early June. UNODC/MCN received reports of flowering poppy fields as late as July 2006 in isolated, high altitude areas. Based on surveyors' reports, an estimated 35 ha of eradication took place during May 2006.



Afghanistan: Estimated Eradication (Governor-led and AEF) by District, 2006

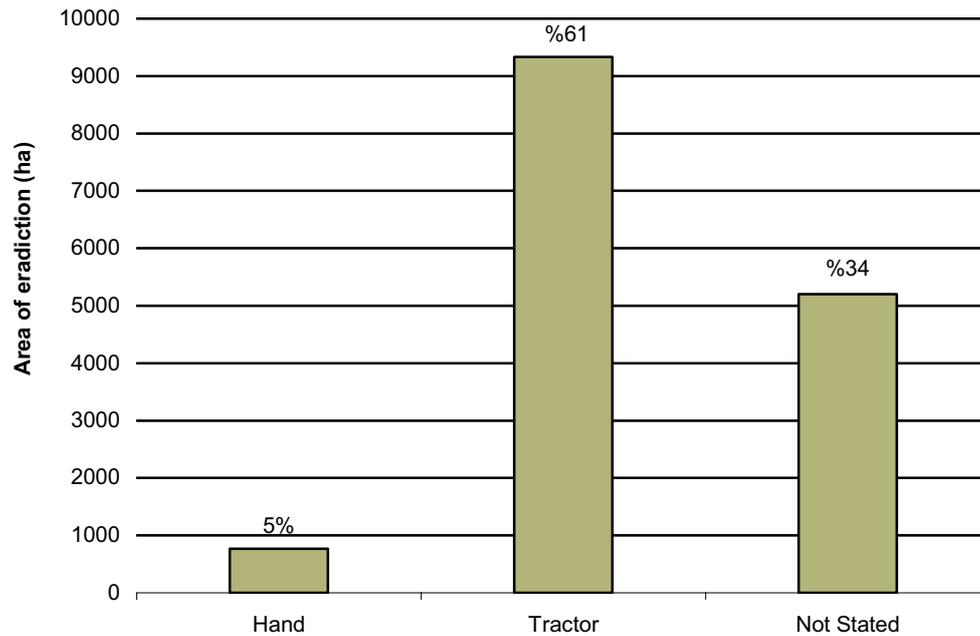


Source: ICN - UNODC 2006 Afghanistan Eradication Survey 2006
Note: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

Eradication Methods

A number of methods were used in 2006 to eradicate opium poppy. Hand methods included the use of a variety of hand held implements such as sticks, sickles and scythes. AEF further used mechanical line trimmers ('weed eaters'). These methods are particularly useful in fields that are difficult to access, such as narrow terraced fields, though until the opium poppy plants have reached late 'cabbage' stage (15-20 cm high), they are not highly effective. Tractor methods included the use of a variety of ploughs or wooden beams towed behind a tractor or all terrain vehicles. This method is the quickest and most efficient. It can be used effectively at all stages of poppy growth, but requires easy access to the fields.

Figure 25: Methods of eradication



As in previous years, there were some claims of airborne spraying of herbicides to eradicate opium poppy fields. This survey found no evidence of aerial or ground based spraying, nor of the use of biological controls in opium poppy fields in 2006.

Hand eradication of opium poppy fields, Badakshan June 2006



On left eradication using sticks, on right eradication using sickles.

Tractor eradication of poppy fields, Badakshan June 2006



On left ATV towing wooden beam, on right tractor towing plough..

A number of issues were identified during the 2006 eradication verification survey that should be addressed prior to any survey next year and prior to any Governor-led eradication campaign in 2007. These issues include field security for verification surveyors, the verification of eradication of partially harvested opium poppy fields, and strategies developed by opium poppy farmers to deter eradication or to limit the impact of eradication on their opium harvest.

Surveyors generally visited eradicated villages two or three weeks after the eradication took place. In many instances, opium poppy farmers were hostile towards anyone they saw as associated with eradication including UNODC/MCN surveyors. This hostility made it too dangerous for surveyors to visit eradicated villages in some areas, in particular villages in Hilmand. In 2007, verification surveyors could work concurrent with the Governor-led eradication teams. This would allow surveyors to take advantage of the security teams provided to the eradication crews, and remove the discrepancy between Governors' estimates of eradication and UNODC/MCN estimates.

Towards the end of the opium poppy growing season some Governors gave eradication reports to UNODC/MCN that included areas where opium had been partially or completely collected from fields prior to eradication. According to the UNODC/MCN verification methodology, opium poppy fields, on which harvest (lancing) had already started, were not included in the final estimate of eradication. Towards the end of the eradication season, some opium poppy farmers appeared to have become aware of this and started harvesting before eradication teams arrived in their villages, even if the opium poppy capsules were not yet mature. Governor-led teams were reluctant to eradicate these fields as they would receive no credit for doing so. While farmers would get a low opium yield by lancing early they would have more time to carry out further lancing once eradication teams departed from their village. It should be considered that by eradicating fields that had only one or two lancements at least 50% of potential opium yield would still be destroyed. If a mechanism was introduced in 2007 to give Governors some credit for eradication of partially lanced fields, farmers might be discouraged from carrying out such premature lancements.

In 2006, there were frequent reports of agreement between farmers and eradication teams on where and much eradication would take place in a village. This generally led to a more peaceful eradication program this year compared to 2005. In 2007, it appears likely that many farmers will cultivate opium poppy in marginal, rain-fed land in addition to the cultivation on the more productive, irrigated fields. If eradication teams visit their village, farmers can negotiate with the teams to eradicate the opium poppy in the rain-fed areas while leaving opium poppy in the irrigated fields alone. The farmer would suffer little economic loss from having these fields eradicated, and eradication teams would be able to report extensive eradication. Therefore, more emphasis needs to be placed on the level of standing opium poppy remaining after eradication as a measure of success, when assessing the effectiveness of Governor-led eradication programs.

Methodology:

Initially, thirty five field surveyors were employed to carry out the verification survey, increasing to forty surveyors by April, 2006. The surveyors were trained in eradication monitoring in Kabul from 20-24 January 2006 and were deployed to the field on 1 February 2006. Their training included field surveying techniques, identification of opium poppy eradication and interviewing skills.

The surveyors regularly visited Governors' offices in 22 provinces and requested the details of Governor led eradication programs. The Governors' Offices were asked to provide village lists consisting of location, date, method and area of eradication. Surveyors reported this information to the Kabul verification officer by telephone as soon as they received the data. The officer then instructed them to visit a sample of the villages provided by the Governor's Office.

Villages were visited as soon as possible after eradication happened, taking into account the local security situation, though the design of the survey did not require all eradicated villages to be visited in order to accurately assess the level of eradication in Afghanistan. If a surveyor did not receive a village list from the Governor's Office, the Kabul officer provided the surveyor with a list of randomly selected villages within the province for them to visit. The surveyors visited the assigned villages and if any eradication had occurred, they collected GPS coordinates and photographs of eradicated fields. They further provided an estimate of the total area of opium poppy eradicated and the total area of standing opium poppy remaining in the village. Surveyors reported these findings to the Kabul officer each day where it was entered into a database.

Estimation of total Governor-led eradication in each province

$$p = \frac{\text{Total eradication verified by surveyors in visited villages in province}}{\text{Total eradication claimed by Governors in visited villages in province}} \quad \text{Equation 1}$$

$$\text{Estimation} = E = p \times \text{Total eradication claim in province by Governor} \quad \text{Equation 2}$$

Estimation of total Governor-led eradication nationwide

$$\text{National eradication estimation} = \sum_{i=1}^{19} E_i$$

Where E_i = Total estimated eradication in province i

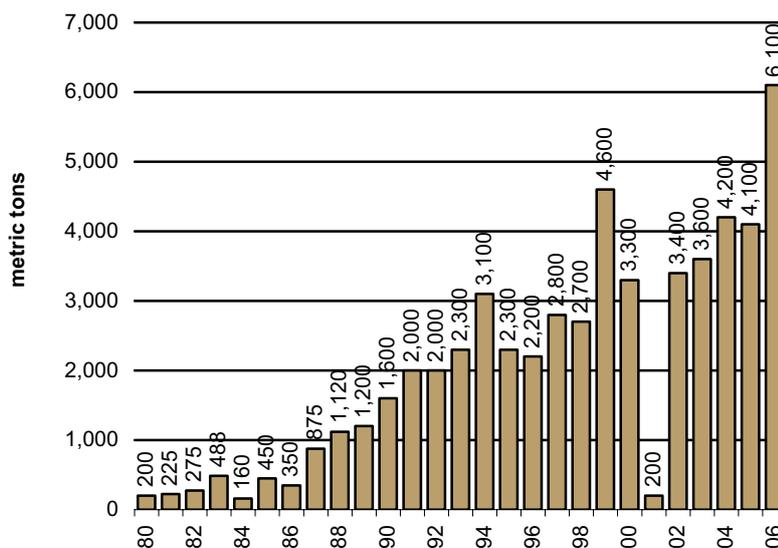
The confidence interval of the estimation was found by using the bootstrap technique. Equation 1 and 2 were iterated 10,000 times to find the confidence interval for the estimation. The 90% confidence interval was estimated as 14,130-16,060 ha.

The survey design did not include an accuracy assessment of the individual measurements done by the surveyors. Imprecision of estimations are possible as the security situation during the eradication verification survey did not allow surveyors to employ time-consuming, sophisticated measurement procedures. The cumulative effect (magnitude and direction) of these imprecision on the final estimate cannot be statistically established but based on random checks UNODC experts estimate that the effect was likely limited.

2.6 Potential Opium Production

The potential opium production was estimated at around 6,100 metric tons, representing an increase of 49% compared to 2005. This is the highest production level ever recorded in Afghanistan. As a consequence, global opium production has also reached its highest point since 1990, at 6,629 metric tons. The proportion of Afghanistan in global opium production increased from 87% in 2005 to 92% in 2006.

Figure 26: Potential opium production in Afghanistan (metric tons), 1980 - 2006



Sources: UNODC, *The Opium Economy in Afghanistan, an International Problem*; and UNODC Opium Surveys, 1994-2006.

Table 25: Largest opium producing provinces (% of total production), 2005 - 2006

Province	2005	2006
Hilmand	25%	46%
Kandahar	12%	7%
Balkh	11%	5%
Farah	10%	5%
Badakhshan	10%	8%
Uruzgan	2%	4%
Day Kundi	2%	4%
Nangarhar	1%	3%

Table 26: Potential opium production by region, 2005 - 2006

PROVINCE	Production 2005 (mt)	Production 2006 (mt)	Change 2005-2006 (mt)	Change 2005-2006 (%)	REGION
Panjshir	0	0	0	0%	Central
Parwan	0	3	3	0%	Central
Kabul	0	2	2	0%	Central
Wardak	4	0	-4	-100%	Central
Logar	0	0	0	0%	Central
Paktia	0	0	0	0%	Central
Ghazni	0	0	0	0%	Central
Khost	0	3	3	0%	Central
Paktika	0	0	0	0%	Central
Central Region	4	8	4	100%	
Nuristan	68	41	-27	-40%	Eastern
Kunar	47	44	-3	-6%	Eastern
Laghman	12	30	18	150%	Eastern
Kapisa	5	10	5	100%	Eastern
Nangarhar	48	179	131	273%	Eastern
Eastern Region	180	304	124	69%	
Badakhshan	308	503	195	63%	North-Eastern
Takhar	57	87	30	53%	North-Eastern
North Eastern Region	365	590	225	62%	
Jawzjan	68	92	24	35%	Northern
Balkh	420	291	-129	-31%	Northern
Kunduz	11	4	-7	-64%	Northern
Faryab	103	162	59	57%	Northern
Samangan	150	81	-69	-46%	Northern
Baghlan	99	134	35	35%	Northern
Sari Pul	125	106	-19	-15%	Northern
Badghis	115	73	-42	-37%	Northern
Bamyan	5	0	-5	-100%	Northern
Northern Region	1098	945	-153	-14%	
Day Kundi	98	148	50	51%	Southern
Hilmand	1004	2801	1797	179%	Southern
Uruzgan	77	236	159	206%	Southern
Zabul	78	113	35	45%	Southern
Kandahar	492	405	-87	-18%	Southern
Southern Region	1749	3703	1954	112%	
Herat	80	54	-26	-33%	Western
Ghor	111	115	4	4%	Western
Farah	424	297	-127	-30%	Western
Nimroz	70	71	1	1%	Western
Western Region	685	537	-148	-22%	
Total (rounded)	4100	6100	2000	49%	

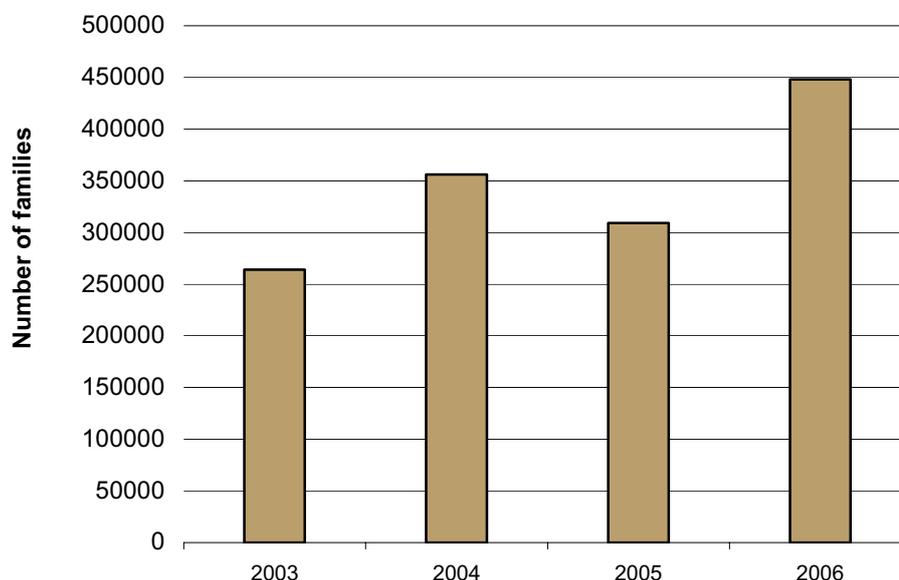
2.7 Security

Security problems increased sharply in Southern Afghanistan in 2006. During the survey period, the security situation was fragile in most of the southern provinces. In the south, military operations were ongoing and Anti Government Elements (AGE) were very active. Unstable security conditions in the region reportedly played a major role in households' decisions about opium poppy cultivation, as the AGE were able to encourage and even threaten farmers to cultivate opium poppy. Main increases in cultivation took place in the southern provinces where most of the high and extreme risk areas are located. Although the security situation was relatively good in Badakhshan, cultivation increased by 77% in 2006. However, opium poppy cultivation was mainly found in Dareem and Argo valleys, where the security was not good. In the plain areas close to the district centres, opium poppy cultivation was stable compared to 2005.

2.8 Opium Farmers

In 2006, the survey collected data on the number of families cultivating opium poppy in Afghanistan. At the national level, it was estimated that 448,000 families (confidence interval: 395,000-501,000) were involved in opium poppy cultivation, compared to 309,000 families in 2005. This is an increase of 45%. Given an average of 6-7 members per family⁵, 448,000 families represented an estimated total of about 3 million persons, or 12.6% of Afghanistan's 23 million total population⁶. This means that 16% of the rural population were involved in opium poppy cultivation, an increase from 11% in 2005.

Figure 27: Number of families involved in opium production in Afghanistan, 2003-2006



⁵ FAO activities update in Afghanistan, N° 2, p. 2, Jan 2003

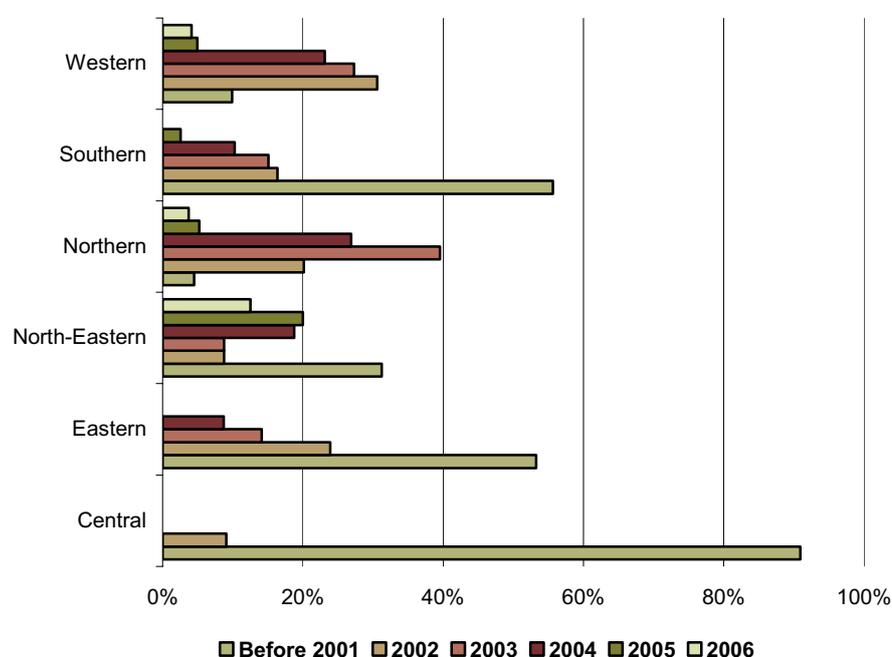
⁶ The Central Statistics Office of the Interim Government of Afghanistan estimated the population at 22.2 million people in 2003. Population growth is estimated at 1.9% per year, resulting in a population estimate of about 23 million in 2006.

Table 27: Proportion and number of families involved in opium production, 2006

Region	2006 Cultivation (ha)	Total number of poppy farming households	Percent of total	Average size of poppy field per poppy growing household (ha)
Central	337	Negligible	Negligible	Negligible
Eastern	8,312	44,998	10%	0.18
North-Eastern	15,234	64,957	14%	0.23
Northern	22,574	80,828	18%	0.28
Southern	101,900	197,561	44%	0.52
Western	16,615	59,125	13%	0.28
Total	165,000	448,000	100%	0.37

The average land area dedicated to opium poppy cultivation per family amounted to 0.37 ha in 2006 compared to 0.34 ha in 2005. In the main opium producing provinces, the average area under opium poppy cultivation reached 0.52 ha per household; while in the other provinces the average area under cultivation was only about half as large (0.18-0.28 ha per household).

The increase by 45% of opium cultivating households in 2006 does not mean that these were all 'new' opium poppy farmers. About 37% of the opium poppy growing farmers in Afghanistan started to cultivate poppy even before the year 2001, and 63% of them started after the year 2001. Only a few farmers started opium poppy cultivation in 2005 (5%) and in 2006 (3%). In 2006, only farmers in North-Eastern, Northern and Western Region of Afghanistan farmers cultivated for the first time. In Southern Afghanistan, where opium poppy cultivation increased by 62% in 2006, none of the farmers cultivated for the first time. Both in the Southern and Eastern Region, around 50% of the farmers started opium poppy cultivation before the year 2001.

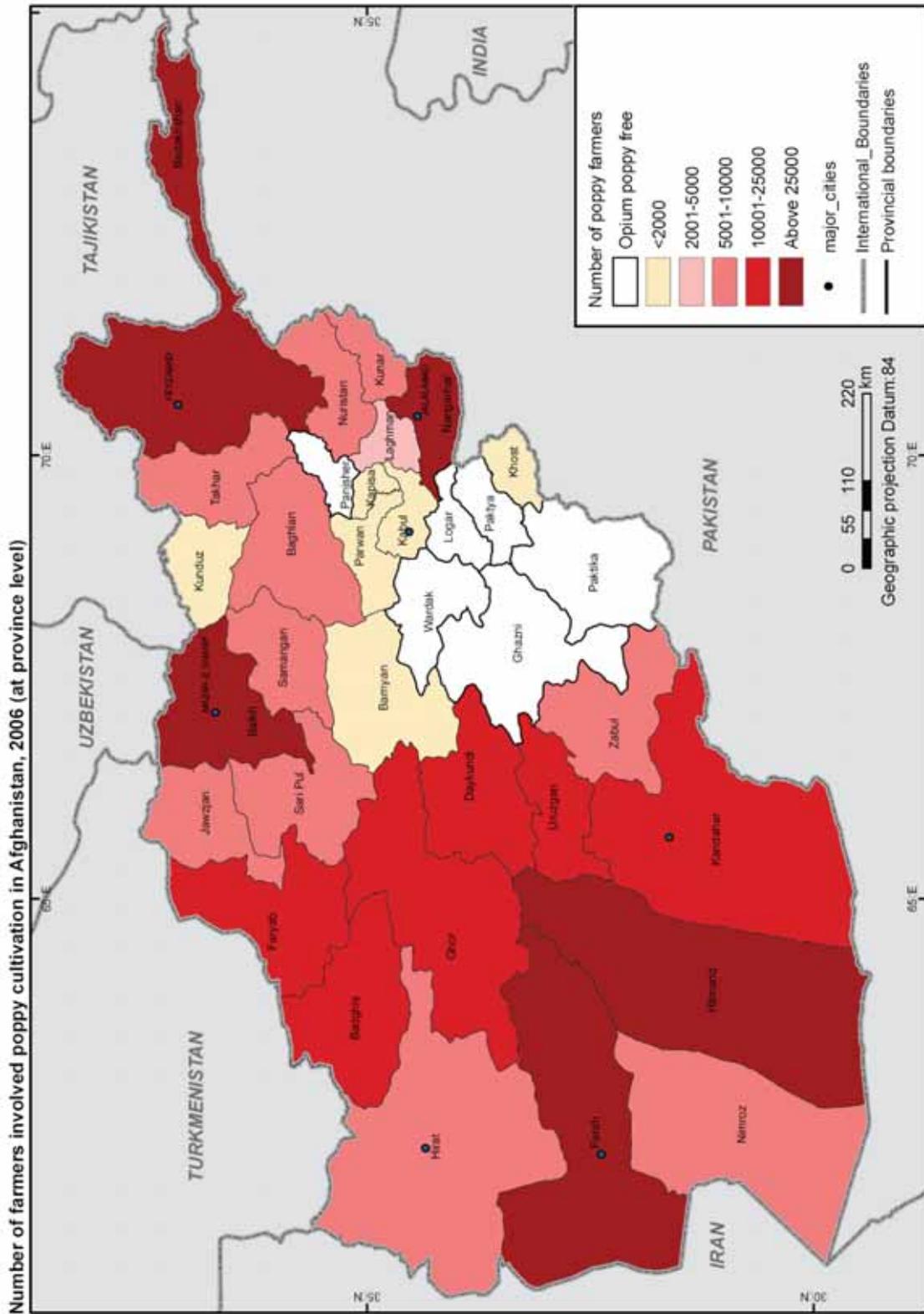
Figure 28: Starting year of opium poppy cultivation by region (n=754)

Under normal conditions, 3 people can harvest one *jerib* (0.19536 ha) of opium poppy in 21 days. Consequently, a total of 2.5 million of persons were needed to harvest the entire opium poppy cultivation in Afghanistan in 2006. The labour available in opium poppy cultivated families (448,000) was not sufficient to harvest the 165,000 ha of cultivation. Therefore, extra labour was

needed for harvesting, especially in Southern Afghanistan. Some parts of Southern Afghanistan experienced a labour shortage due to the record cultivation in 2006. Due to the increased demand on opium poppy harvesting labour, daily wage rates increased from US\$ 6 in 2005 to US\$7.7 in 2006.

Table 28: Daily wage rates for different activities in Afghanistan, 2006

Activity	Daily wage rate per day (US\$)
Labor (roads, construction, etc)	3.5
Lancing / Gum collection	7.7
Poppy weeding	4.8
Wheat harvesting	4.3



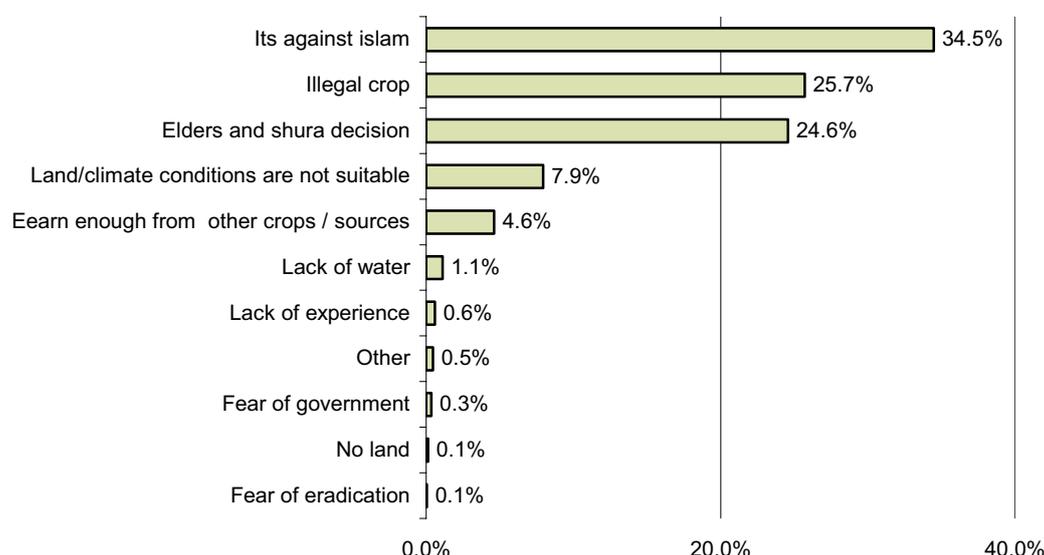
2.9 Reasons for non-cultivation, stopping or growing opium poppy

As part of the survey, 2,344 farmers in 1,554 villages across Afghanistan were asked about their motives for cultivating opium poppy, if they had stopped why they did so, or, if applicable, why they had never grown opium poppy. For the purpose of analysis, the farmers were divided into four groups: active growers (growing in 2006), farmers who had grown opium poppy in previous years but had not done so in 2006 (stopped in 2006), farmers who had stopped growing already in 2005, and farmers who had never grow opium poppy.

Reasons for non-poppy cultivation at all:

The main reason (34.4%) for the farmers never to grow opium poppy was religion. This was followed by the reason that opium poppy is an illegal crop (25.7%) and respect for the decision of elders and the shura not to grow (24.6%). Only 0.1% of this group did not grow because of fear of eradication.

Figure 29: Reasons for never cultivating opium poppy (n=2,344 farmers from 1,554 villages)

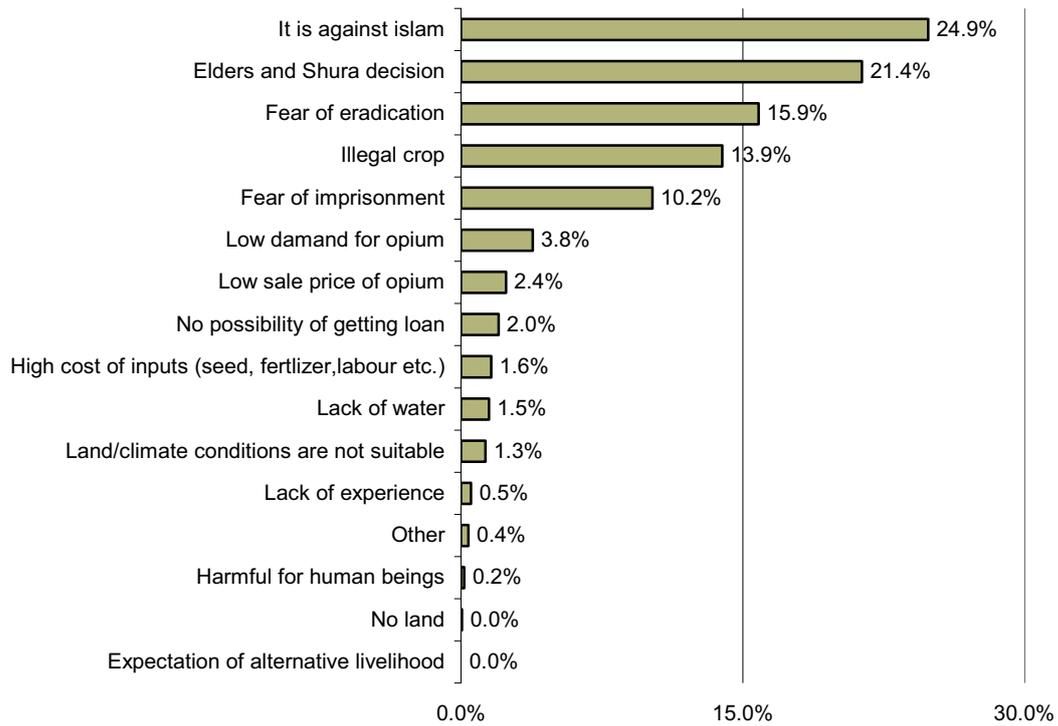


Reasons for non-poppy cultivation in 2006:

37.3% of the farmers who stopped opium poppy cultivation before the year 2006 mentioned the Government ban as the reason for stopping opium poppy cultivation. Elders and shura decisions were important for 22.2% of the farmers in this group. Some had tried opium poppy cultivation and stopped because of poor yield (15.3%), lack of experience (9.2%) or unfavourable climate conditions (5.2%). Only 0.2% mentioned “fear of eradication” as a reason for having stopped opium poppy cultivation.

Shura decisions and religion are less important in Southern Afghanistan compared to the other regions. In Central Afghanistan, ‘Shura decisions’ and religion are the main factors determining farmers’ decisions about opium poppy cultivation. In the Eastern Region, farmers are more concerned about respecting the Government opium poppy ban than in other regions.

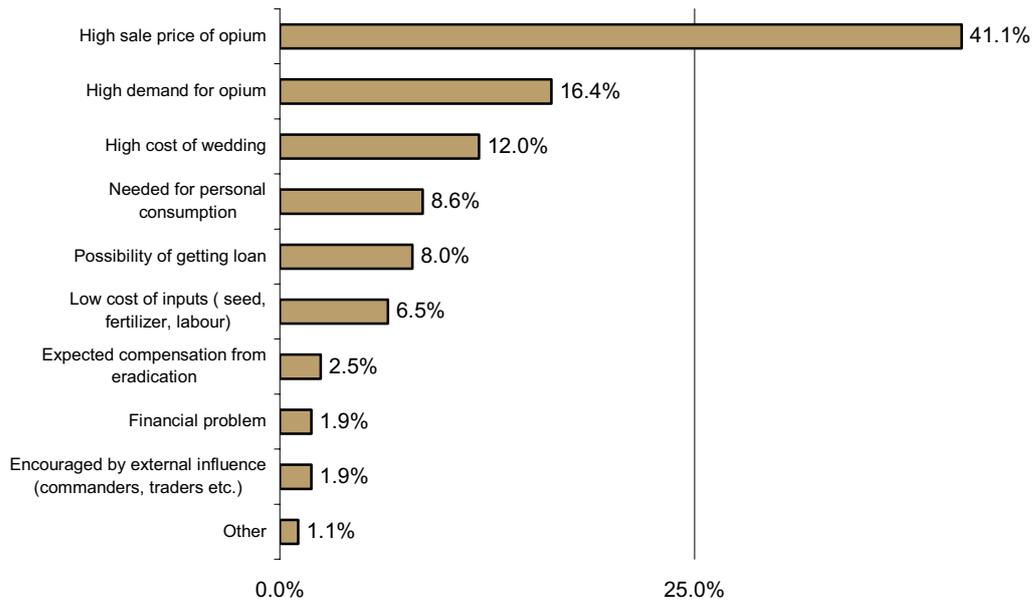
Figure 30: Reasons for not cultivating opium poppy, 2006 (n=898 farmers)



Reasons for opium poppy cultivation in 2006:

Of all the opium poppy growing farmers in 2006, 41.2% gave “high sale price of opium” and 16.3% “high demand” as the main reasons for cultivating opium poppy. Especially in the Northern, North-Eastern and Central regions, farmers mentioned that they needed the opium for personal consumption. High costs of weddings were mentioned as a reason by 11.9%.

Figure 31: Reasons for opium poppy cultivation in 2006 (n=754 farmers from 1,554 villages)



2.10 Loans

Outstanding loans

It is important to understand the financial status of the farmers in order to understand the reasons for opium poppy cultivation and opium dynamics in the country. As part of the survey, farmers were therefore asked whether they had any outstanding loans and whether they took out a new loan in 2006.

Out of 2,777 farmers who provided information, 32% reported to have one or several outstanding loans. This is slightly less than in 2005 (36%). The average amount of the outstanding loans per farmer was US\$701 in 2006 and has remained relatively stable since 2003 (US\$726 in 2005, US\$709 in 2003). The average amount of outstanding loans was equivalent to about three times the per capita GDP in Afghanistan (US\$290 in 2006/07).

Opium poppy farmers had, on average, more outstanding loans (US\$884) than non-opium poppy farmers in 2006, although the proportion of farmers who have outstanding loans is lower in the opium poppy growing group (28%) compared to the non-opium poppy growing groups. However, the individual amount of debt is higher among the opium poppy growers (US\$884). Farmers who never grew opium poppy had an average of US\$616 outstanding loans and 32% of them had outstanding loans. Farmers, who stopped the cultivation in 2006, had less average outstanding loans compared to the other groups.

Table 29: Average outstanding loans for farmers

	Opium poppy growing farmers	Non-poppy growing farmers		
		No poppy in 2006	Stopped poppy before 2006	Never grew poppy
Average Loan (US\$)	884	575	702	616
Percent of farmers having loan	28.0%	32.8%	34.0%	32.0%

There are pronounced regional differences in the loan-taking behaviour both concerning the average amount of loan by farmer and the proportion of farmers taking loans. In Central Afghanistan, 26% of all farmers had outstanding loans in 2006 with an average amount of US\$600. Farmers in the North-Eastern region had the lowest average amount of outstanding loans (US\$ 606) whereas farmers in the Eastern region had the highest debts (US\$857).

Table 30: Average outstanding loans for farmers per region

Region	Average Loan (US\$)	Proportion of farmers having outstanding loan
Central	606	26%
Eastern	857	19%
North-Eastern	442	7%
Northern	651	17%
Southern	817	17%
Western	721	15%

In all regions, the average amount of outstanding loans of opium poppy farmers was always higher among opium poppy growing farmers than among non-poppy growing ones.

New Loans

The amount of new loans taken in 2006 was, on average, US\$644 per farmer (poppy and non-poppy farmer), which was 29% higher than in 2005 (US\$500). However, the 2006 average is well below the 2003 level (US\$699).

Opium poppy growing farmers took an average of US\$680 new loans in 2006. This amount is slightly higher than the for the non-opium poppy growing farmers.

Table 31: Average new loans taken by farmers

	Poppy growing farmers	Non-poppy growing farmers		
		No poppy in 2006	Stopped poppy before 2006	Never grew poppy
Average Loan (US\$)	680	641	654	635
Proportion of farmers took new loan in 2006	21.0%	27.2%	24.0%	29.0%

About 37% of the farmers in Central Afghanistan took new loans in 2006 with an average amount of US\$806. This is the highest average amount of all regions. The vast majority of the farmers in Central Afghanistan did not grow opium poppy previously, and most of the provinces in that region had been almost opium poppy free until 2006. However, the high proportion of loan takers in combination with the high average amount of loans could encourage farmers in this region to grow more opium poppy in the coming seasons to repay these loans. The lowest average amounts of new loans were taken by farmers in the North-Eastern region (US\$362). Only 6% of the farmers in the Eastern region, where opium cultivation decreased sharply in 2005 and did not increase very much in 2006 in absolute terms, took new loans in 2006.

Table 32: Average new loans taken out by farmers per region

Region	Average Loan (US\$)	Proportion of farmerstook new loan in 2006
Central	806	37%
Eastern	543	6%
North-Eastern	362	8%
Northern	708	17%
Southern	696	15%
Western	330	16%

Sources of new loans

47% of the opium poppy growing farmers reported to have obtained their loans from shopkeepers and traders. It is important to note that shopkeepers and traders are often involved in the opium business. The next most frequent source were relatives (25.6%). Other sources included fellow villagers, such as neighbours, headmen and shura chiefs (15.6%), NGOs (9.4%), and Government bank credits (2.5%).

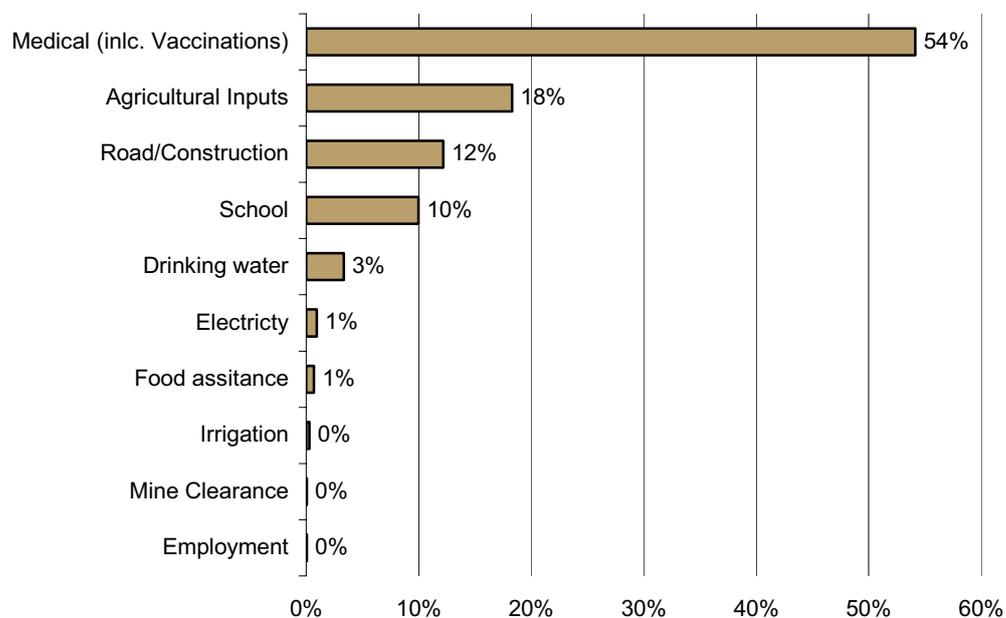
In the case of all non-opium poppy growing farmers, the usage of Government bank credits was much higher compared to opium poppy growing farmers. For 20.2% of the farmers who had never grown opium poppy the source of the loan was Government bank credit. Non-opium poppy growing farmers also used shopkeepers and traders less than the opium poppy growing farmers.

Table 33: Sources of new loans taken out by farmers

Loan source	Poppy growing farmers	Non-poppy growing farmers		
		No poppy in 2006	Stopped growing poppy before 2006	Never grew poppy
Shopkeeper/Trader	46.9%	27.8%	32.0%	26.1%
Relative/Friend	25.6%	39.9%	35.0%	41.9%
Fellow villager	15.6%	10.8%	18.0%	7.3%
NGOs	9.4%	3.6%	5.0%	2.8%
UN	0.0%	1.6%	2.0%	1.4%
Government Credit	2.5%	16.1%	8.0%	20.2%
Unknown	0.0%	0.3%	0.0%	0.2%
Total	100.0%	100%	100.0%	100.0%

2.11 External assistance and farmers expectations

Headmen in all surveyed villages were asked about the type of assistance the village received in 2005 and to what extent the assistance provided matched their expectations. Out of 1,554 villages, which provided information on these questions, the headmen of 1,171 villages (75%) confirmed to have received some form of external assistance in 2005. Most assistance was in the field of medicine, (54%), followed by agricultural inputs (18%), road/construction activities (12%), school construction (10%) and drinking water (3%).

Figure 32: External assistance interventions - mentions by headmen (n = 1554 villages)

Out of 1,171 villages, which got external assistance in 2005, 683 (58%) did not cultivate opium poppy in 2006 and 42% did.

Table 34: External assistance and opium poppy status of villages as reported by headmen (n = 1,171 villages)

Assistance received in 2005	Opium poppy cultivation in 2006		
		No	Yes
	No	37%	63%
Yes	58%	42%	

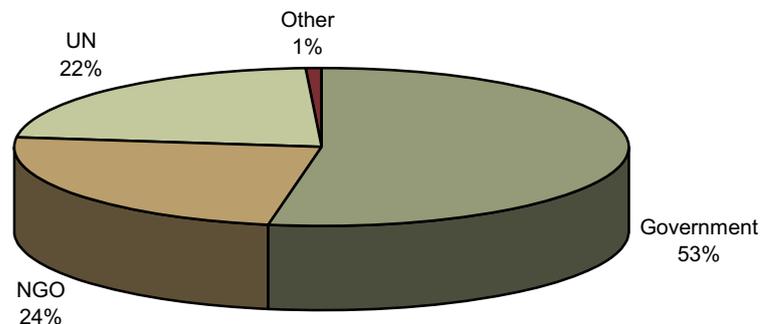
Only a small proportion of the assistance reached villages in the North-Eastern region in 2005 while a large part went to villages in the Central Afghanistan.

Table 35: External assistance and of village as reported by headmen by region (n = 1,171 villages)

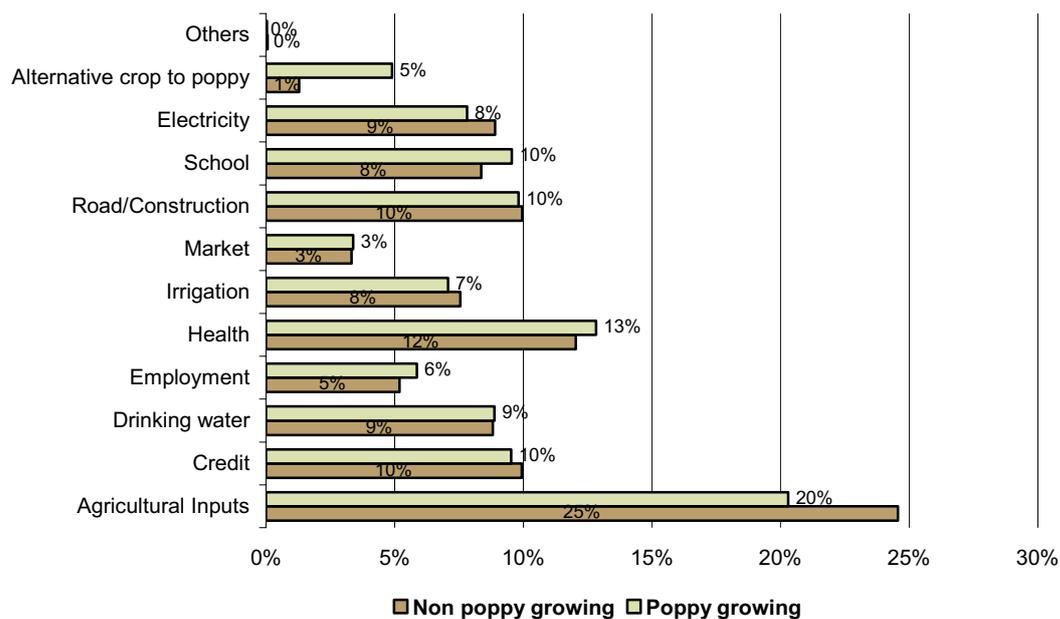
Region	% of receiving external assistance in total
Central	28%
Eastern	17%
North-Eastern	9%
Northern	16%
Southern	17%
Western	14%
Grand Total	100%

In 2005, 39% of the villages, which got external assistance, grew opium poppy and this remained largely unchanged in 2006 (38%). Like in 2005, it is very difficult to make relation between having received external assistance and opium poppy growing status. There is no difference between 2005 and 2006 concerning the type of the external assistance provided to the villages. No or very little assistance was provided in the fields of employment, irrigation, electricity, food assistance and drinking water, both to opium poppy growing and non-growing villages, which is similar to the situation in 2005.

The Government provided 53% of the total assistance and the rest was provided by NGOs (24%), United Nations (22%) and others (1%).

Figure 33: Provision of the external assistance

Of the total provided external assistance, only 20% matched the villagers' expectations. Almost none assistance for alternative crop was provided to opium poppy growing farmers in 2005. The expectations of farmers concerning credits, market for their crops, irrigation and electricity were not met at all.

Figure 34: Percent match of villagers expectations with provided external assistance

2.12 Income generation for farmers

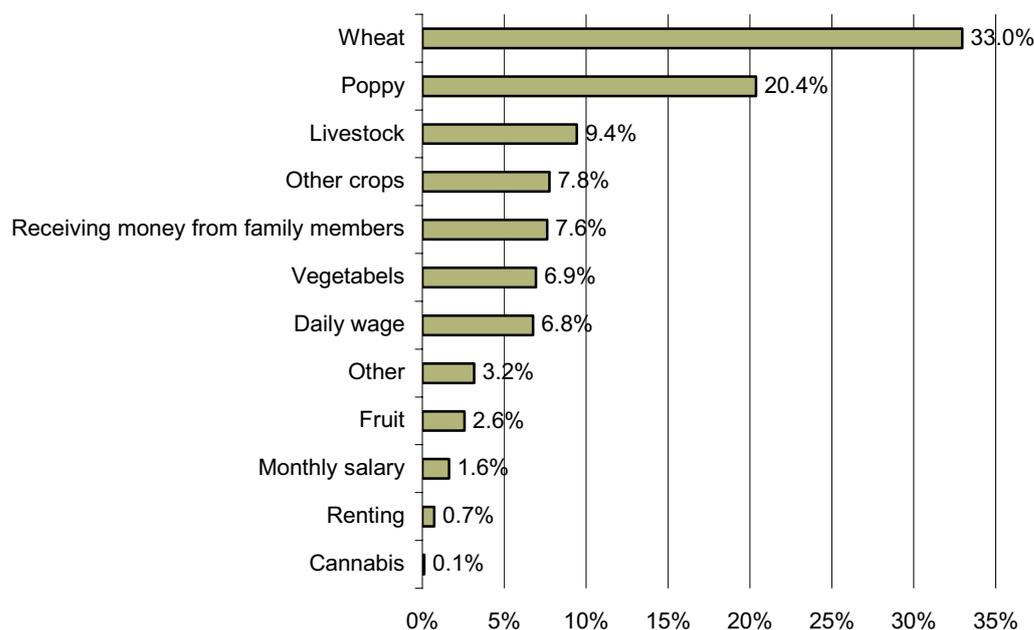
Village survey data on income in the previous year show that the average annual income of opium poppy growing households in 2005 was 36% higher than of non-growing households.

Opium poppy growing households in Southern Afghanistan earned a much higher annual income than in other regions. However, also non-growing households in Southern Afghanistan region reported higher incomes than in other regions. In Central Afghanistan the annual income of both opium poppy growing and non-growing households was among the lowest.

Of the five main opium cultivation provinces in 2006 (Hilmand, Badakhshan, Kandahar, Uruzgan and Farah), only one province (Badakhshan) reported lower income levels. The average annual household income in the other four provinces was relatively high, between US\$ 1,601 and US\$ 2,000. In the poorest provinces (US\$ 800-1,100), Badakhshan, Bamyan, Wardak and Paktika, the level of opium poppy cultivation in 2006 was negligible, except in parts of Badakhshan. This indicates that there is no a direct relation between cultivation and poverty.

Table 36: Annual income level of farmers by opium poppy growing status

Region	Average annual income for poppy growing farmers US\$	Average annual income for non poppy growing farmers US\$	% difference between poppy growing and non growing farmers
Central	1,897	1,487	22%
Eastern	2,187	1,818	17%
North-Eastern	2,134	1,134	47%
Northern	2,690	1,851	31%
Southern	3,316	2,480	25%
Western	2,258	1,721	24%
Over all	2,747	1,754	36%

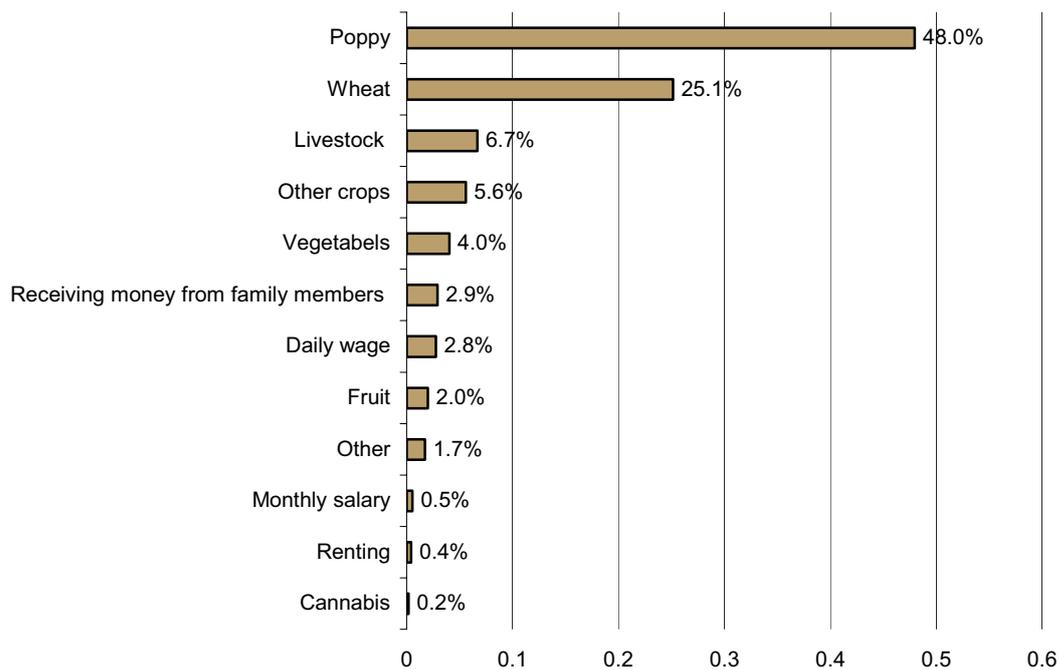
Figure 35: Source of income generation for farmers (n=3107 in 1554 villages)

The importance of different sources of income differs from region to region. In Southern Afghanistan, in 2005, the proportion of income derived from opium was 35% of the total income, which was the highest in Afghanistan. By contrast, in Central Afghanistan, the proportion of income from opium is only 1.6%. The proportion of income from opium was 27.7% in the North-Eastern, 18.4% in the Eastern, 16.8% in the Northern and 14% in the Western Region.

Table 37: Sources of income generation for farmers by region

Region	Cannabis	Daily wage	Fruit	Livestock	Monthly salary	Other	Other crops	Poppy	Receiving money from family members	Renting	Vegetables	Wheat	Grand Total
Central	0.0%	13.8%	4.6%	9.0%	3.2%	1.7%	4.5%	1.6%	13.5%	1.4%	13.8%	32.8%	100%
Eastern	0.1%	11.4%	0.2%	14.3%	4.0%	5.0%	10.3%	18.4%	11.1%	0.9%	3.9%	20.4%	100%
North-Eastern	0.0%	6.8%	0.4%	14.6%	1.2%	1.4%	4.9%	27.7%	3.0%	0.7%	2.1%	37.2%	100%
Northern	0.0%	4.5%	0.4%	7.1%	1.3%	3.3%	13.2%	16.8%	5.0%	0.7%	8.8%	38.7%	100%
Southern	0.3%	2.5%	5.4%	7.5%	0.6%	3.5%	7.5%	35.2%	3.9%	0.5%	6.1%	26.9%	100%
Western	0.0%	6.5%	0.0%	10.6%	0.6%	3.1%	4.6%	14.0%	10.9%	0.3%	3.1%	46.3%	100%

Figure 36: Source of income generation for opium poppy growing farmers (n=754)



For the opium growing farmers, the breakdown by region shows a different picture. In the Eastern, North-Eastern and Southern regions, about half of the total income stems from opium, while in the other regions the proportion is considerably lower.

Table 38: Sources of income generation for opium poppy growing farmers by region

Region	Cannabis	Daily wage	Fruit	Livestock	Monthly salary	Other	Other crops	Poppy	Receiving money from family members	Renting	Vegetables	Wheat	Grand Total
Central	0.0%	9.0%	0.0%	13.0%	4.6%	0.8%	1.5%	27.7%	18.0%	0.0%	6.0%	19.3%	100%
Eastern	0.0%	9.0%	0.0%	7.6%	0.9%	3.1%	6.6%	51.4%	6.7%	0.5%	2.0%	12.2%	100%
North-Eastern	0.0%	2.5%	0.0%	8.8%	0.9%	0.0%	2.3%	53.2%	0.8%	1.3%	0.5%	29.7%	100%
Northern	0.0%	2.0%	0.0%	5.9%	0.5%	2.0%	10.1%	41.3%	1.5%	0.2%	4.5%	31.9%	100%
Southern	0.4%	1.9%	4.0%	6.2%	0.3%	1.9%	5.3%	51.2%	2.0%	0.4%	5.1%	21.3%	100%
Western	0.0%	2.0%	0.0%	7.2%	0.5%	1.1%	2.0%	40.3%	5.5%	0.4%	2.9%	38.1%	100%

2.13 Ethnic distribution

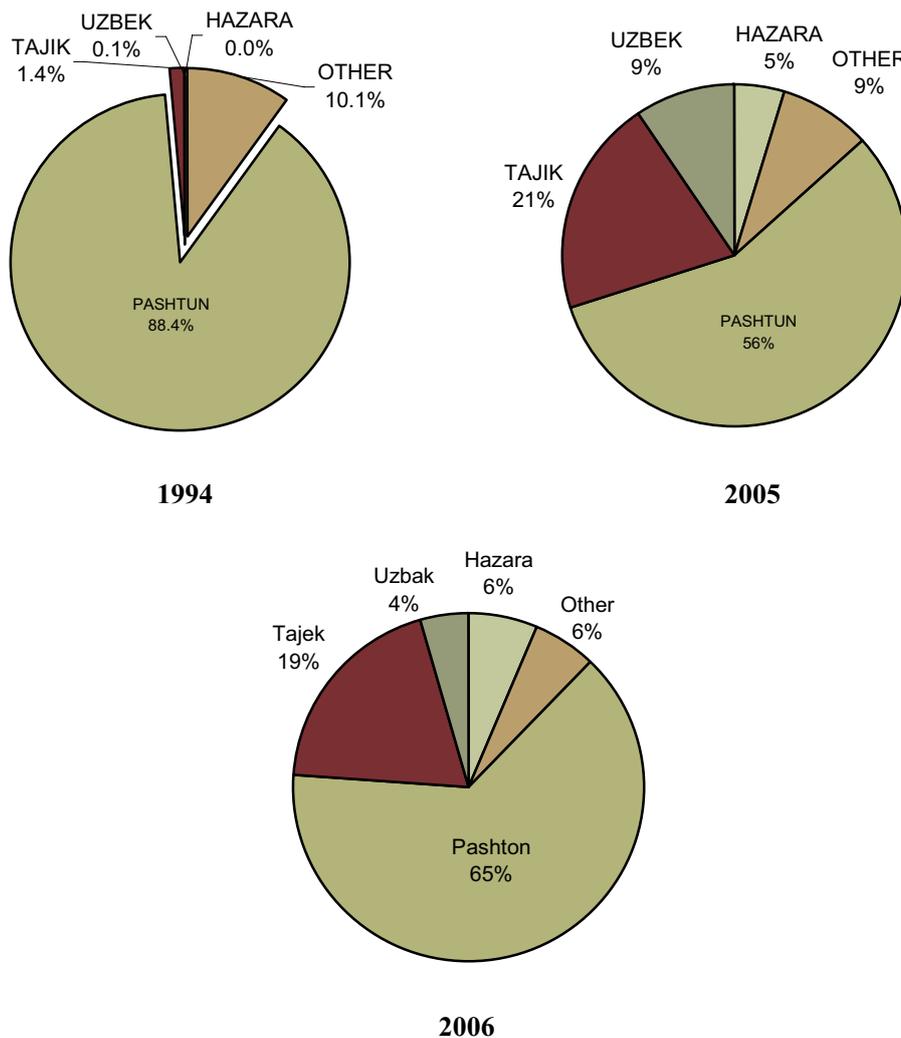
As part of the village survey, data was collected from the village headmen in 1,554 villages on the ethnic/linguistic distribution among the surveyed population.

In terms of production, available data for 2006 shows that more than half of the country’s opium production (65%) originated from Pashtun farmers, followed by Tajik/Dari-speaking farmers (19%), Hazara farmers (6%) and Uzbek farmers (4%).

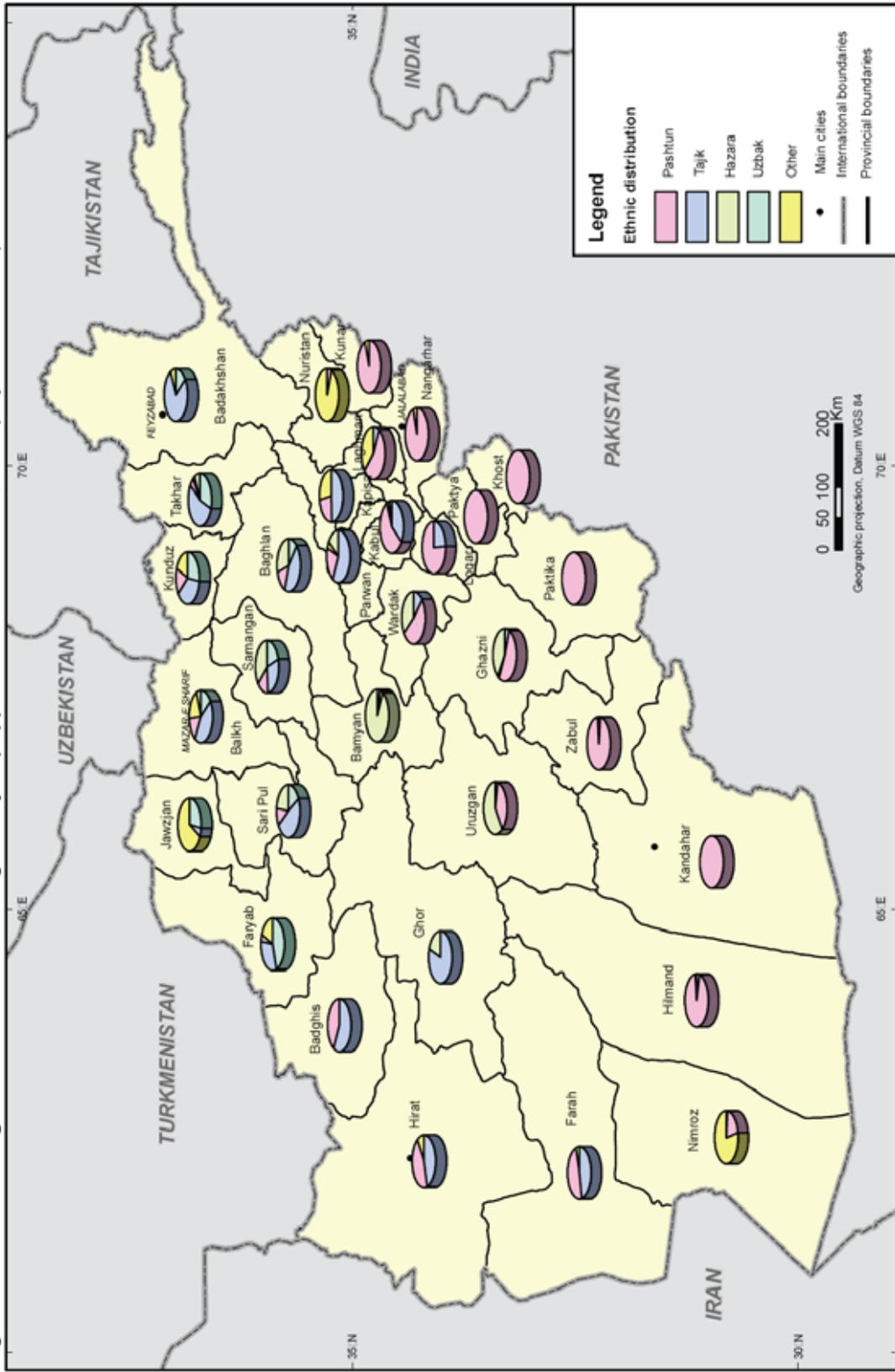
A comparison with data collected in 1994 showed a clear increase of opium production among Tajik, Uzbek, Hazara and other ethnics while the proportion of opium production among the country’s Pashtun population declined (from 88% (1994) to 65% (2006)). However, it should be noted that the proportion of Pashtun farmers increased compared to 2005 when it was only 56%.

The results were derived by distributing provincial opium production according to the distribution of the population in opium producing villages. This assumes a homogeneous distribution of opium poppy farmers in villages of mixed ethnic composition – which is not necessarily the case. Therefore, the percentages of the ethnic distribution of opium farmers presented here must be treated with caution.

Figure 37: Ethnic distribution of population in opium producing villages in 1994, 2005 and 2006



Afghanistan: Ethnic/linguistic distribution among surveyed population in rural areas, 2006 (at province level)



Source: MCN - UNODC Afghanistan Opium Survey 2006
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

2.14 Opium prices

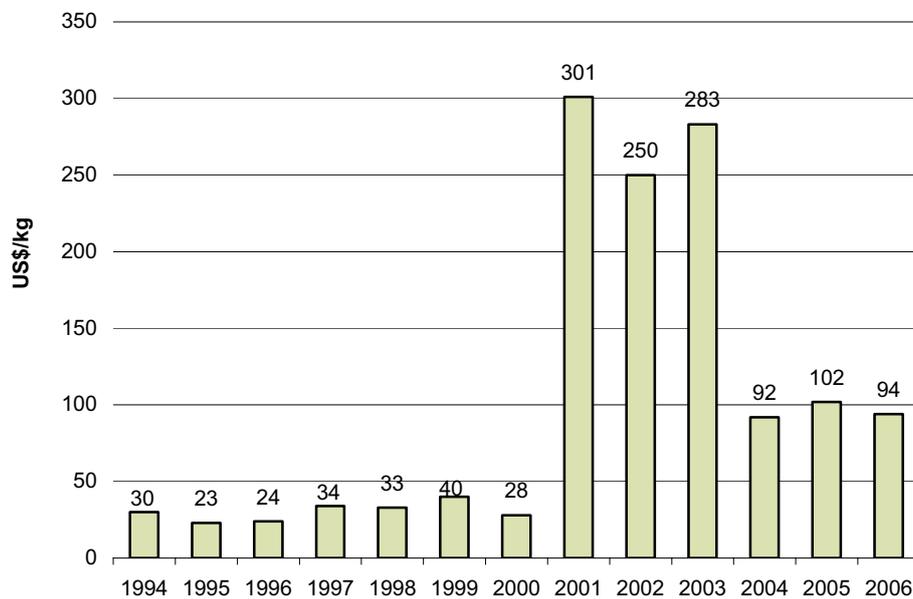
Based on interviews in 1,554 villages, the average weighted fresh opium price was calculated as US\$94/kg. Compared to 2005, fresh opium prices at harvest time were 8% lower.

The prices of dry opium at the harvest time decreased by 9% to US\$125 (weighted price) and were 9% lower than at the harvest time in 2005.

Opium prices decreased in all the regions, except in the east of Afghanistan. Prices decreased by 13% in the Southern Region, 12% in the Northern Region and 9% in the Western Region, due to increase in production. Opium prices were almost stable in the North-Eastern Region with only a 2% decrease. The highest dry opium prices were reported in the Eastern (US\$ 191) and Central Regions (US\$ 207) where opium production is low. In 2005, opium prices in the Eastern Region had risen due to a dramatic decline of opium production. In 2006, opium production picked up again (resulting in a lower fresh opium price), but to lower levels than before. In the Central region, opium prices remained high, since opium poppy cultivation is not a common practice and at a negligible level.

In general, prices in the Northern Region were lower than in other regions, because of the low morphine content of the opium produced in that region.

Figure 38: Fresh opium farm-gate prices at harvest time ((US\$/kg weighted by production), 1994 - 2006



Sources: UNODC, Opium Surveys 1994-2006

Table 39: Farm-gate prices for opium at harvest time by region (US\$/kg), 2006

Region	Average Fresh Opium Price (USD) - 2005	Average Fresh Opium Price (USD) - 2006	Change	Average Dry Opium Price (USD)-2005	Average Dry Opium Price (USD)-2006	Change
North-Eastern (Badakhshan, Takhar)	76	79	4%	128	125	-2%
Northern (Bamyan, Jawzjan, Sari Pul, Baghlan, Faryab, Balkh, Samangan, Badghis, Kunduz)	90	77	-14%	112	99	-12%
Central (Parwan, Paktya, Wardak, Khost, Kabul, Logar, Ghazni, Paktika)	153	151	-1%	235	207	-12%
Southern (Hilmand, Uruzgan, Kandahar, Zabul)	120	99	-18%	141	122	-13%
Western (Ghor, Hirat, Farh, Nimroz)	124	106	-15%	164	150	-9%
Eastern (Nangarhar, Kunar, Laghman, Nuristan, Kapisa)	151	101	-33%	179	191	7%
National average price weighted by production	102	94	-8%	138	125	-9%

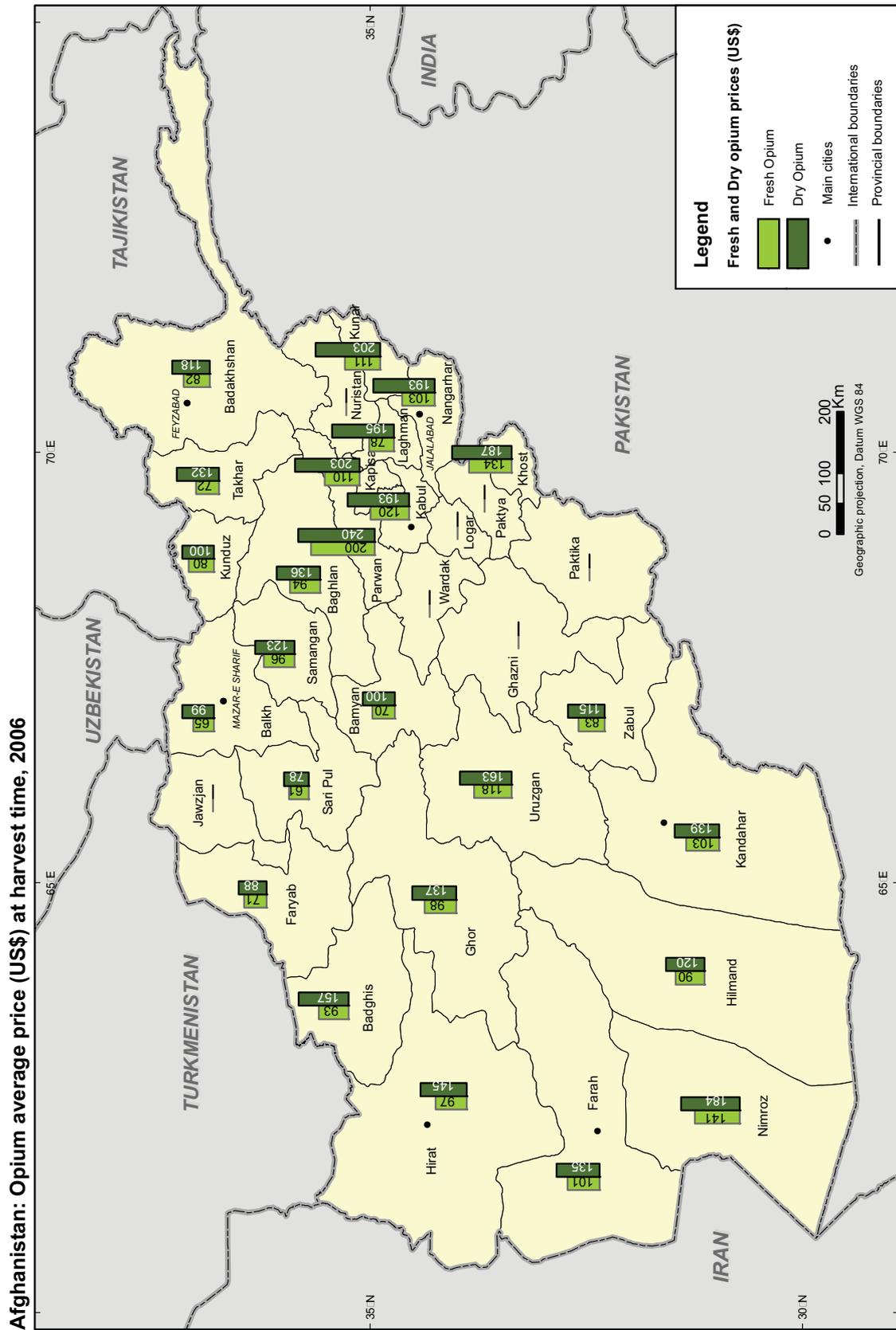
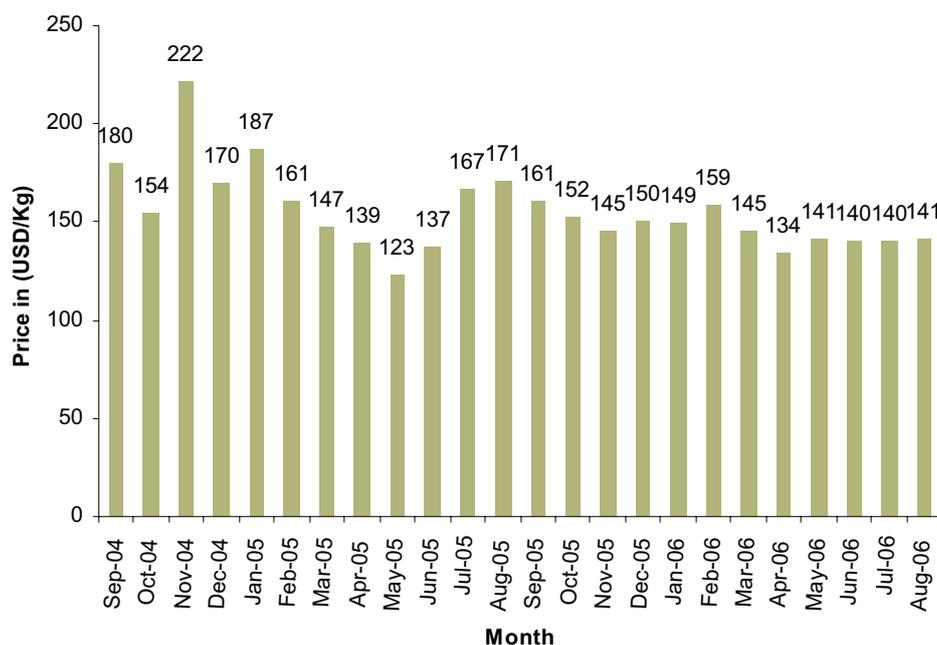


Figure 39: Farm-gate prices for dry opium prices (US\$/kg) between Sept. 2004 – Aug. 2006

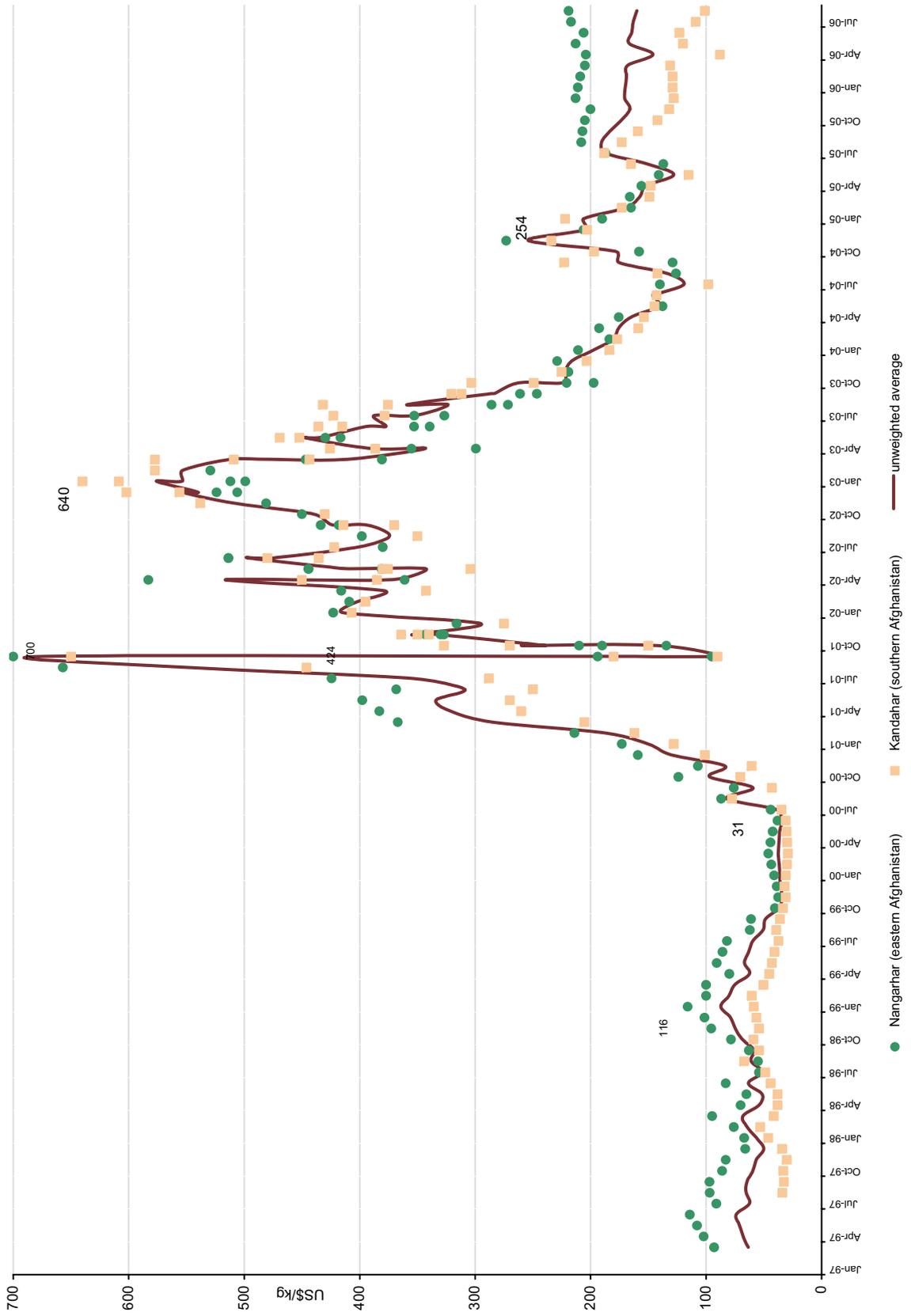
Opium prices have been regularly collected by UNODC since 1997 in selected parts of Nangarhar (eastern Afghanistan) and Kandahar (southern Afghanistan), as part of the UNODC/ICMP project on Monitoring Opium Production in Afghanistan. Since a few years ago, prices have also been collected in Badakhshan, Balkh, Hilmand and Hirat, from both opium poppy farmers and local opium traders. Recently, Faryab, Takhar, Kunduz, Ghor, Farah, Laghman and Kunar provinces were also included into this price monitoring system.

At the end of August 2006, the average price for one kilo of dry opium in Afghanistan at the farm gate level amounted to US\$ 141. Overall, dry opium prices decreased by 18% between August 2005 and August 2006. At breakdown by region shows a varied situation: prices decreased sharply in the Western (47%) and Southern regions (48%) while they increased in the Northern (24%) and Eastern (13%) region.

Table 40: Farm gate and trader prices for dry opium (US\$/kg), August 2005 and August 2006

Region	Regional Average Price (USD/Kg) / August 05		Regional Average Price (USD/Kg) / August 06		Trader Change
	Farm gate	Trader	Farm gate	Trader	
Eastern region (Nangarhar, Kunar, Laghman)	171	172	193	195	13%
Southern region (Hilmand, Kandahar)	143	152	72	79	-48%
Western region (Hirat, Ghor, Farah)	164	188	94	100	-47%
North-eastern region (Badakhshan, Takhar)	107	134	111	116	-13%
Northern region (Balkh, Faryab, Kunduz)	83	85	102	105	24%
Average	136	148	118	122	-18%

Afghanistan, prices of dry opium in Nangarhar and Kandahar collected from Traders, US\$/kg, March 1997 - August 2006



2.15 Migration

Immigration to the surveyed villages:

Village headmen were asked about immigration to their villages and the reasons. A total of 2,938 families moved into the surveyed villages, which corresponds to 13 persons per village. Less than half of the migrants (46%) moved into non-opium poppy growing villages, and the rest (54%) into opium poppy growing villages.

1,291 families (44%) moved into villages in Northern Afghanistan and just over half of them (56%) into opium poppy growing villages. Out of 427 families who moved into the Southern provinces, almost all (97%) chose opium poppy growing villages, whereas families who moved to the Eastern region preferred non-opium poppy growing villages.

Figure 40: Distribution of immigration by regions

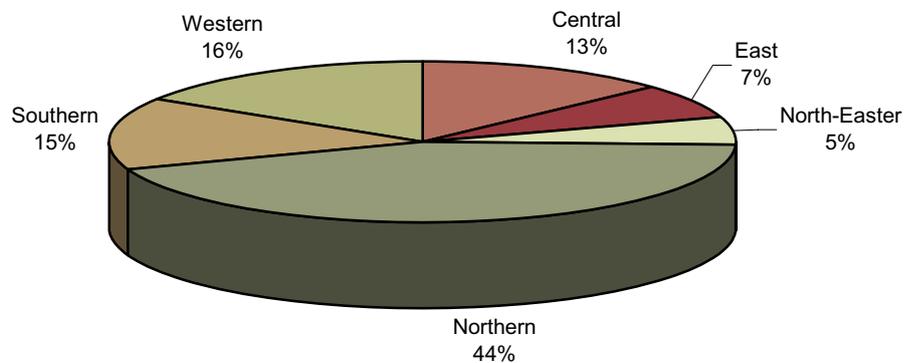
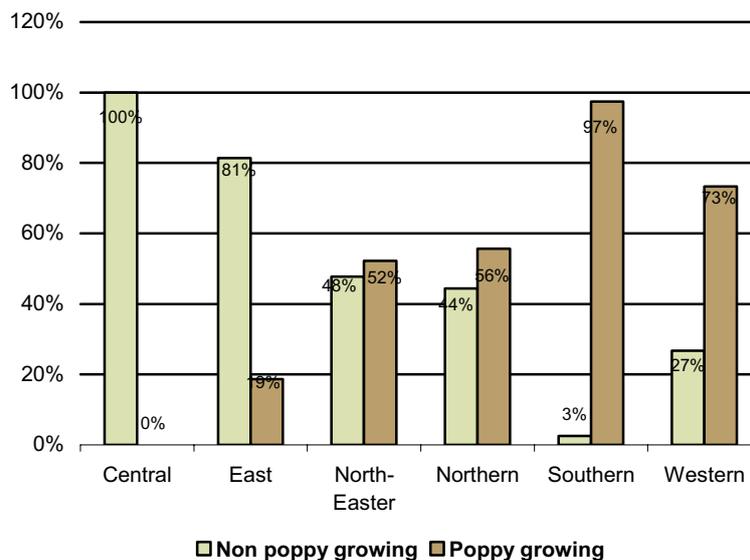
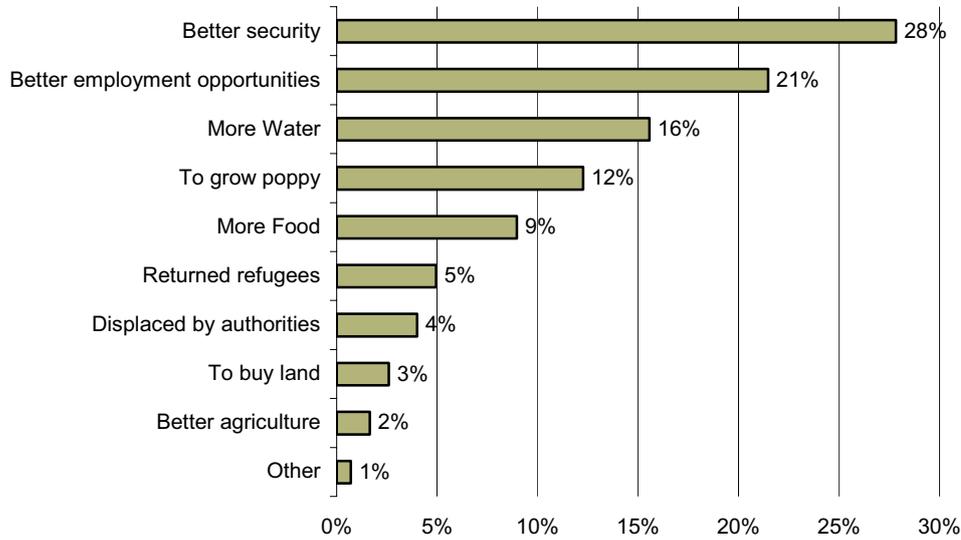


Figure 41: Migration to opium poppy growing and non growing villages (by region)



Reasons given for immigration were better security (28%), better employment opportunities (21%), better irrigation possibilities (6%), and growing opium poppy (12%).

Figure 42: Reasons for immigration

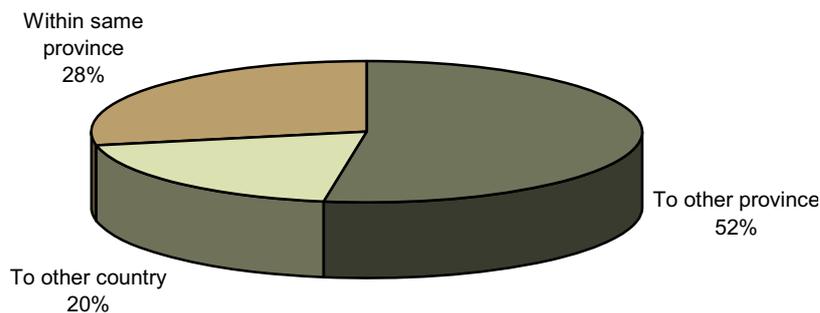


Out migration from surveyed villages:

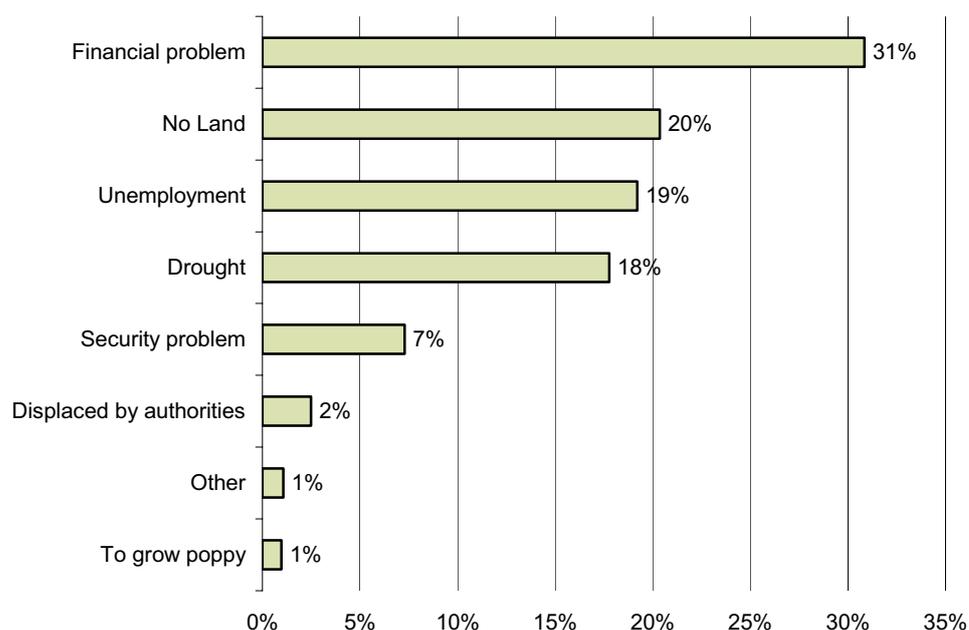
In 2006, a total of 6,717 families moved out of the surveyed villages to other provinces, to other district in same province or to another country. This corresponds to an average of four families or approximately 30 persons per village. A total of 3,146 families (47%) left opium poppy growing villages and the rest non-poppy growing villages.

The majority of the out migrants moved to other provinces (52%), and only 28% moved to another location in same province or left the country (20%) .

Figure 43: Preferred out migration destinations by villagers (n=1554)



Financial problems (31%), lack of land (20%), unemployment (19%) and drought (18%) were the main reasons for out migration from the surveyed villages. Only 1% of the farmers left to grow opium poppy somewhere else.

Figure 44: Reasons for out migration (n=1,554)

2.16 Potential value and income to farmers

Based on opium production estimates and reported opium prices the farm-gate value of the opium harvest can be estimated at around US\$760 million (90% confidence interval: US\$690 to 830 million). The bulk of the income was earned by farmers in southern Afghanistan, accounting for almost 60% of total income from opium production.

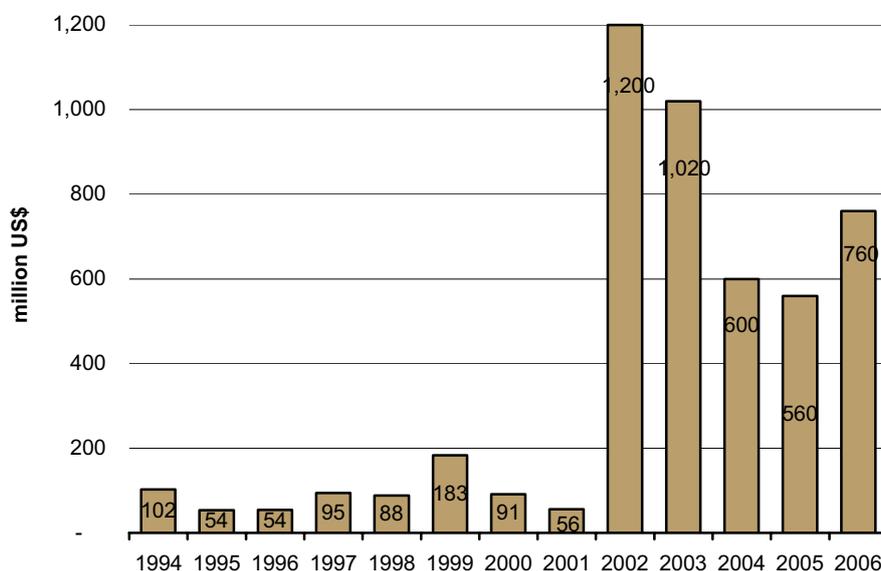
Table 41: Farm-gate value of opium production in 2006

Region	Production of dry opium in kg	Price of dry opium per kg in US\$	Farmgate value in million US\$
Southern	3,703	122	451.8
Northern	945	99	93.6
North-Eastern	590	125	73.8
Western	537	150	80.6
Eastern	304	191	58.1
Central	8	207	1.7
Total	6,087	125	760
Total rounded	6,100		
90% confidence interval	5,520-6,680	+/- 2.6	690-830

Given the strong growth in opium production, the overall farm-gate value of opium production was some 36% higher than in 2006. The higher production, however, impacted on prices which declined by more than 9%. As a consequence, increases in farmers' income were less pronounced

than the expansion of opium production (49%). Though farmers' income in 2006 is higher than in 2005 or in 2004, it is still a third lower than in 2002 but eight times the average income over the 1995-2000 period.

Figure 45: Estimated value of opium production at farm-gate level in Afghanistan, 1994 - 2006



The gross income to farmers from poppy cultivation of US\$760 million is equivalent to around 11% of GDP, the same ratio as in 2005 though down from 22% in 2003. Helmand farmers earned around US\$330 million which is 44% of the total income for farmers in Afghanistan in 2006.

Reflecting lower prices and more families involved in opium poppy cultivation, average gross family income per poppy farmer was US\$1,700 in 2006, slightly down from 2005 (US\$1,800) and significantly down from 2003 (US\$3,900) when opium prices had been substantially higher. Average gross per capita income of all family members of poppy farmers declined from around US\$600 in 2003 to US\$280 in 2005 and US\$260 in 2006.

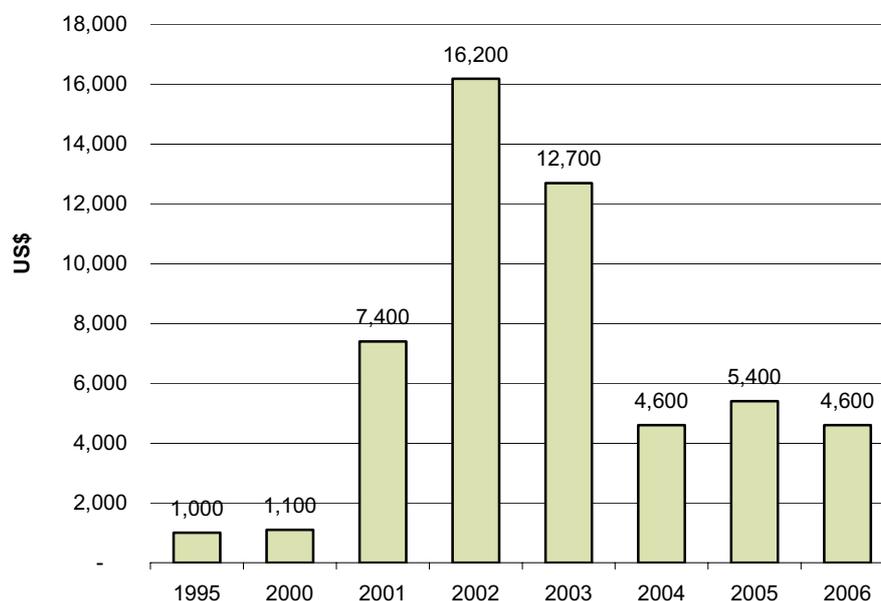
Table 42: Average family and per capita income of poppy growing families from opium production in 2003, 2004 and 2005

	2003	2004	2005	2006
Gross income in million US\$	\$1,020	\$600	\$560	\$760
Estimated No. of poppy farmers	264,000	356,000	309,000	448,000
Average income per poppy farmer	\$3,864	\$1,685	\$1,813	\$1,696
Rounded	\$3,900	\$1,700	\$1,800	\$1,700
No. of farmers and members of their families	1,716,000	2,314,000	2,008,500	2,912,000
Per capita income of poppy growing families	\$594	\$259	\$279	\$261
Rounded	\$600	\$260	\$280	\$260

Gross income of opium poppy cultivation per hectare amounted to US\$4,625 (yield of 37 kg of dry opium per ha × price of US\$125 of dry opium per kg). The income from a hectare under cultivation was thus about the same as in 2004 (US\$4,600), though less than in 2005 (US\$5,400) reflecting lower prices and slightly lower yields per hectare. Opium income per hectare is clearly

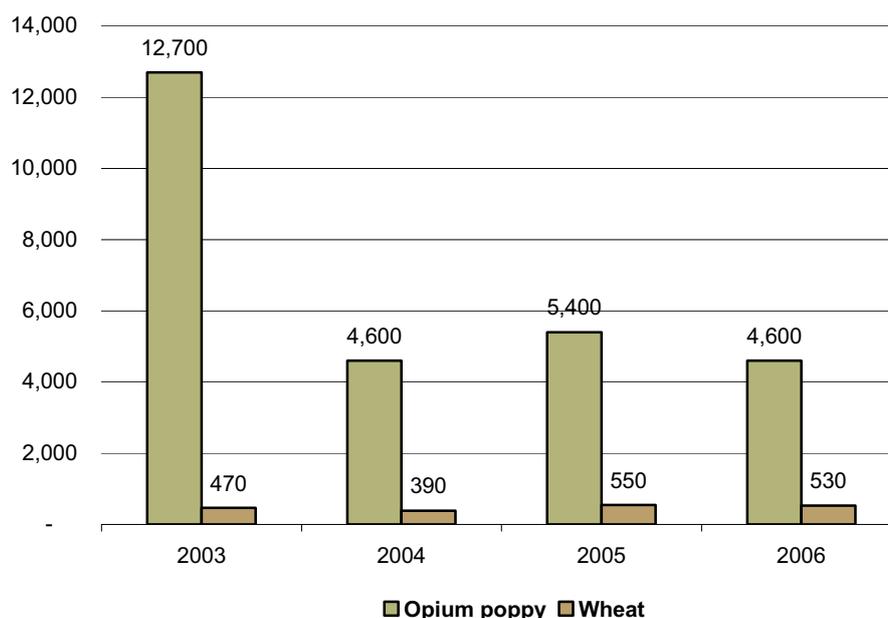
less than over the 2001-2003 periods, though some four times the levels in the 1990s or in 2000. A family cultivated, on average, 0.37 hectares of opium poppy in 2006.

Figure 46: Gross income of opium poppy cultivation per hectare in US\$



The difference between the gross income from a hectare under wheat as compared to a hectare under poppy cultivation remained important (9:1 ratio), though it continued declining. While in 2003 a hectare under poppy cultivation would bring a farmer 27 times more in gross income than a hectare under wheat production, the respective ratio declined to 12 in 2004, 10 in 2005 and 9 in 2006. The comparison is based on the gross income from a hectare under poppy cultivation and the expected gross income from a hectare of an irrigated wheat field.

Figure 47: Gross income of opium poppy and wheat per hectare in 2003, 2004, 2005 and 2006



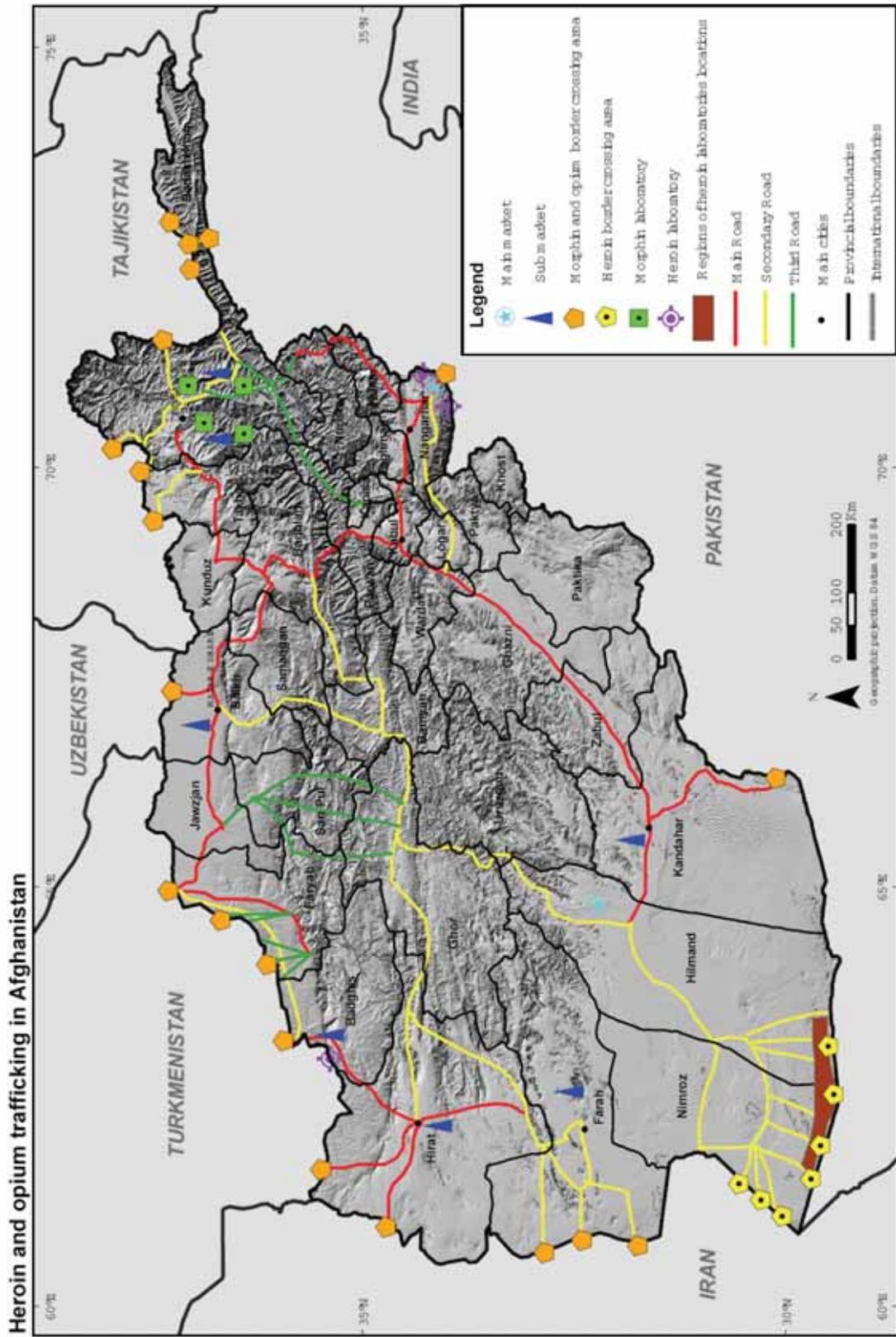
Sources: UNODC, FAO/WFP.

2.17 Opium and heroin trafficking

An overview map of trafficking activities in Afghanistan is provided on page 102. Though the opium survey is not designed to collect intelligence on trafficking, some information on opium and heroin trafficking was provided from experienced surveyors in the debriefing sessions, based on reports from informants. The information displayed in the map, showing main opium markets, morphine/heroin producing centres and transit points, refers to the January-September 2006 period. The map shows, for instance, the main morphine/heroin producing centres to be located in south/south-western Afghanistan (Hilmand, Nimroz and Kandahar). Other major production centers are in Nangarhar and Badakshan. In addition, some production facilities were reported from Baghlan province.

The seizure data and information from information from UNODC regional offices indicate that around 53% of the Afghan opiates leave the Afghanistan via Iran, 32% via Pakistan and 15% via Central Asian countries.

Surveyors reported that around 50% of the opium produced in the Northern provinces left the provinces southward. Traffickers usually preferred the mountains and difficult accessible roads during the summer time to transport the opium from North to South (through Saripul, Ghor, Day Kundi and Hilmand). This was in contrast to general findings, that traffickers choose the closest border crossing (as they can thus avoid paying 'transit fees').



2.18 Potential Value and income to the Afghan economy

The potential value of Afghanistan's 2006 opium harvest for the Afghan economy (accruing to farmers, laboratory owners and Afghan traffickers) was calculated to have reached about US\$3.1 billion, compared with US\$2.7 billion in 2005. The increase was about 15% and thus less than the increase in production (49%) – reflecting falling opium and heroin prices in neighbouring countries as Afghan drug exports increased. As compared to the year 2000, the overall opium related income for the Afghan economy was, however, three times higher. UNODC calculations suggest that Afghan traffickers earned US\$1.2 billion in opium exports and US\$1.9 billion in heroin and morphine exports.

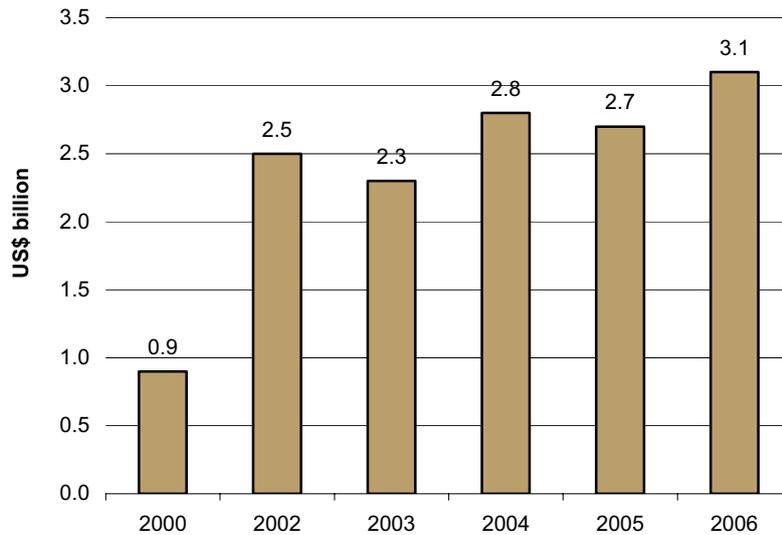
The potential national income from opium production is based on the value of opiates exports at prices in the border areas of neighbouring countries. This approach is based on the observation that Afghan traffickers are heavily involved in shipping opiates across the borders, but from there onwards traffickers from neighbouring countries usually take over the drug shipments. The methodology for calculating the overall gross income estimates from opium production for the Afghan economy was, for the first time, developed in UNODC's report on *The Opium Economy in Afghanistan – An International Problem (New York 2003)* and repeated in subsequent years in the annual opium survey report. A number of variables (production, extent and degree of involvement of Afghan traffickers in shipping opiates abroad, proportion of the transformation of opium into heroin & morphine in Afghanistan, conversion rate of opium into heroin, prices in the main export markets etc.) have been taken into account to arrive at the estimates. Detailed explanations of the calculations are found in the methodology section of this report.

The average export price of opium obtained by Afghan traffickers in neighbouring countries in the border regions with Afghanistan amounted to around US\$633 per kilogram in 2006 and was thus lower than the average export price calculated in last year's report (US\$890), reflecting lower opium prices in Iran, Pakistan and Tajikistan. The decline was particularly pronounced in Iran, reflecting the strong increase of opium production in southern Afghanistan and thus the strongly falling opium prices in southern Afghanistan.

The average export price of heroin in the border regions of neighbouring countries with Afghanistan amounted to US\$3,330 per kilogram and thus continued to decline (US\$3,860 in 2005 and \$4,170 in 2004). Lower heroin prices were reported from Iran, Pakistan and Tajikistan.

Data suggest that the decline in opium prices (-30%) was more pronounced than the decline in heroin prices (-14%) in 2006. The strong rise in the number of dismantled heroin laboratories in 2006 (248 until the end of August, up from 26 in 2005) may have contributed to less significant increases in heroin exports as compared to opium exports. UNODC estimates suggest that opium exports from Afghanistan increased by 68% in 2006 while morphine & heroin exports increased by 'just' 32%.

Figure 48: Potential income from opium production, 2000-2006 (gross income for farmers and Afghan traffickers)



Sources: UNODC, *The Opium Economy in Afghanistan*, UNODC, *Afghanistan Opium Survey 2003, 2004 and 2005*.

Expressed as a percentage of licit GDP (US\$6.7 billion in 2005/6), the overall potential value-added of the opium sector for Afghanistan in 2006 is estimated to have been equivalent to 46% of licit GDP or 32% of the overall economy, if the opium sector is included in the economy. Given the strong growth of licit GDP, the overall size of the illicit opium industry in Afghanistan, declined, however, from 61% of licit GDP in 2004 to 52% in 2005 and 46% of licit GDP in 2006.

The main beneficiaries from opium production in Afghanistan have been - once again - the drug traffickers. About 76% of the total incomes from Afghanistan's opium economy were reaped by traffickers (including laboratory owners) and 24% by farmers. Income of farmers increased, however, stronger in 2006 (36%) than the income of traffickers (9%) which rose from US\$2.14 billion in 2005 to US\$2.34 billion in 2006, equivalent to 35% of licit GDP in 2006 and down from 41% of GDP in 2005. Nonetheless, these are still substantial amounts in the hands of the war lords and organized crime which - in cooperation with the insurgency - have the potential to destabilize the country.

Figure 49: The licit economy and the opiate industry in Afghanistan in 2006

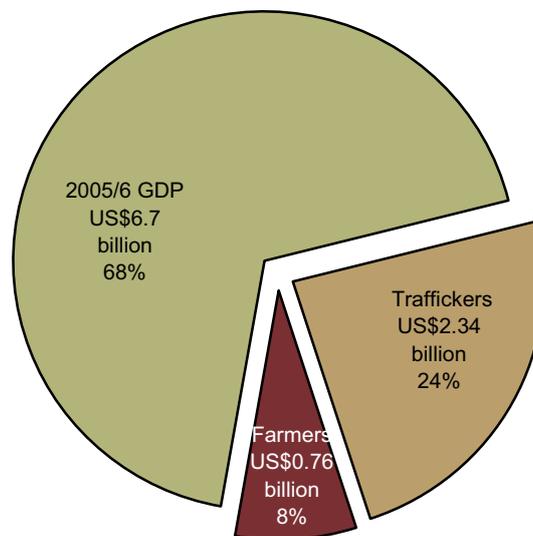
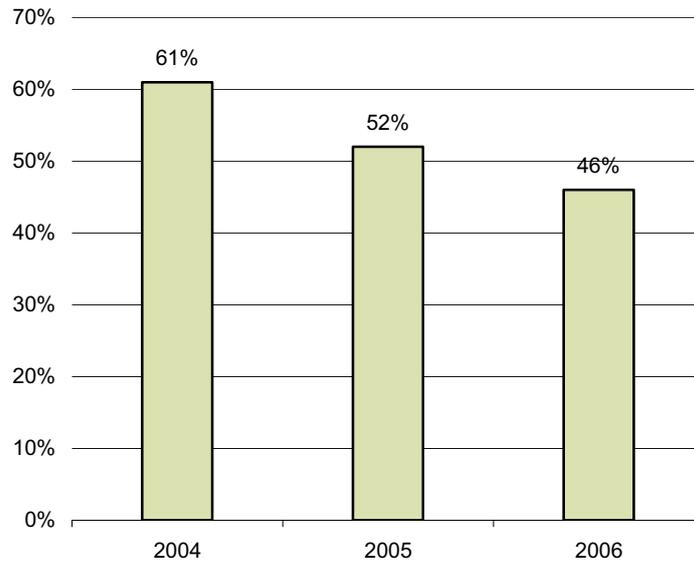


Figure 50: The Afghan opiate industry compared with the licit economy (as a percentage of licit GDP)



3 METHODOLOGY

This chapter covers various methodological aspects such as estimations of the extent of opium poppy cultivation, opium yield and production, opium prices and the opium poppy growth calendar. It also covers socio-economic aspects such as the number of families involved in opium poppy cultivation, reasons for cultivation/non-cultivation of opium poppy and the income from opium to farmers and traffickers. The survey methodology was based on a sampling approach that combined the use of satellite imagery and extensive field visits.

UNODC has a cooperation agreement with the National Soil Resource Institute, Cranfield University (United Kingdom) to develop new survey techniques and to improve the survey methodology. As a result of this cooperation, the 'bootstrap' technique was introduced for the first time in 2004 for calculation of the variance of the cultivation estimates. In addition to this, a national sampling frame (10x10 km grids for entire Afghanistan) was introduced to the survey, instead of provincial sampling frames. In 2005, a "bias correction" method was introduced to further improve the opium poppy area estimates. The bias correction method makes use of ground reference data to calibrate the estimates from the satellite imagery. In 2006, a trial was conducted with the so-called Frame Sampling Tools (FST) methodology for opium cultivation estimation was assessed for in 5 provinces, namely Helmand, Kandahar, Nimroz, Farah and Balkh.

3.1 Opium Poppy Cultivation

A remote sensing approach has been used by UNODC since 2002 to monitor the extent of opium poppy cultivation in the main opium poppy growing areas of Afghanistan, because satellite imagery supported with good ground reference information offers a reliable and efficient tool for the estimation of opium poppy cultivation and minimizes the security problems faced by the surveyors in the field.

In 2006, a total of 210 high-resolution satellite images were acquired for 105 sample locations covering 19 provinces. These images covered 16% of the total agricultural land in these 19 provinces. This is an increase of satellite coverage compared to 2005 and 2004. In 2005, 190 images at 79 sample locations were processed to cover 15 provinces accounting for 214,000 ha agricultural land, whereas in 2004, only 112 images at 56 sample locations were processed to cover 10 provinces accounting for 131,000 ha agricultural land. The nineteen provinces surveyed in 2006 using satellite data accounted for 95% of the opium poppy cultivation of the country. In the remaining 15 provinces, opium poppy cultivation was estimated from the surveyors' assessment of the extent of opium cultivation in sampled villages.

Establishment of the sampling frame for satellite image selection

The sampling frame was established by extracting the potential land available for opium poppy cultivation in 19 provinces. The arable land was delineated from 2002 and 2003 Landsat-7 images. The arable land in the sampling frame covers mostly irrigated areas, except in Badakshan province, where rain-fed land is also included. The total arable land in the 20 provinces amounted to 16,486 km² (or 1,648,680 ha), which is equivalent to 37% of the total irrigated agricultural area in Afghanistan. Land use maps of Hilmand, Kandahar, Balkh, Farah, Uruzgan and Nangarhar provinces were updated using SPOT imagery (10m resolution) of 2005.

The area under opium poppy cultivation was interpreted based on high-resolution IKONOS (10x10 km) and Quickbird (8x8 km) satellite images. The IKONOS image locations were randomly selected from a 10x10 km grid that was overlaid on the map of arable land. Cells with less than 1% arable land were removed in order to cover the maximum arable land with a minimum number of cells. The final sampling frame consisted of 1,828 cells in 19 provinces. Optimizing the sampling frame reduces the probability of selecting a cell containing marginal areas of arable land, which ensures optimal use of the high-resolution satellite images.

Sample selection

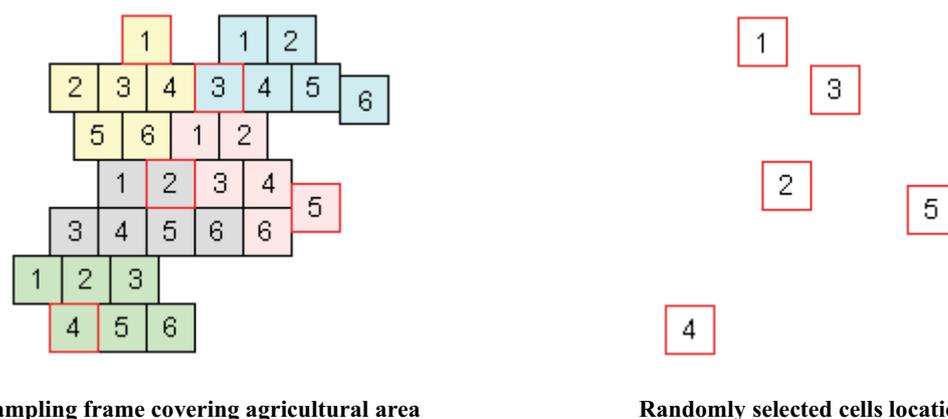
For each collected cell, IKONOS/Quickbird images were acquired for the pre-harvest and a post-harvest period, which aided in the discrimination of opium poppy from other crops. In view of the available budget, the total number of IKONOS/Quickbird images was limited to cover 105 pairs locations (210 multi-spectral images) well distributed within 19 provinces. The distribution was based on the number of cells in the sampling frame and total arable land in each province.

Table 43: Agricultural land sampled by province

Province	Total Arable land (km ²)	Total # cells	Selected # cells	% of selected cells over total cells	Arable land in selected cells (km ²)	sample size (% of arable land in selected cells)
Hilmand	2,055	115	13	10%	424	21%
Nangarhar	971	53	8	15%	297	31%
Uruzgan	552	84	3	4%	54	10%
Badakhshan	398	52	6	8%	146	37%
Ghor	617	184	5	3%	15	2%
Kandahar	1,226	121	9	6%	296	24%
Kunar	220	28	4	11%	28	13%
Laghman	233	23	4	13%	41	18%
Zabul	506	82	4	5%	23	5%
Hirat	1,509	223	6	3%	100	7%
Saripul	486	70	4	6%	51	10%
Baghlan	907	110	4	4%	88	10%
Farah	990	132	5	4%	112	11%
Balkh	1,600	70	6	9%	363	23%
Day Kundi	427	97	5	5%	42	10%
Samangan	212	51	3	6%	15	7%
Faryab	1,338	114	5	4%	117	9%
Jawzjan	1,190	52	4	8%	287	24%
Nimroz	740	57	3	5%	96	13%
Badgish	310	110	4	4%	50	16%
Total	16,487	1828	105	6%	2,645	16%

To ensure adequate geographical distribution of the sample throughout the province, the cells were grouped in clusters. The number of clusters was equivalent to the number of images to be selected for the sample in each province. Consequently, one cell was randomly selected from each cluster. For example, to select 5 cells, 30 cells from a province were grouped in 5 clusters containing 6 cells each (Fig. 57 left). From each cluster, one cell was randomly selected (Fig. 57 right).

Figure 51: Cells selection



Finally, 105 pairs were selected for the sample representing a sampling ratio of 16% of the total arable land of the 19 provinces.

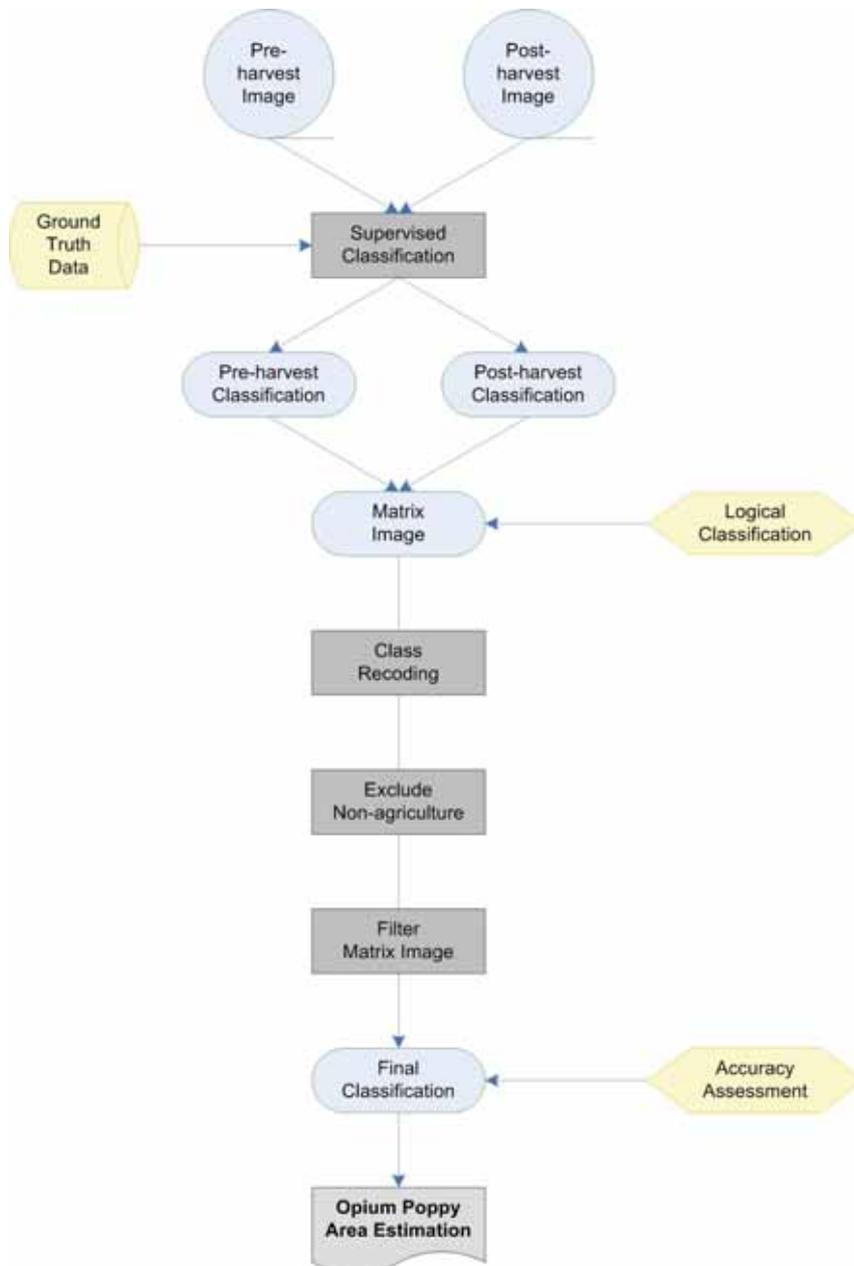
Image processing steps

The image processing steps can be summarized as follows:

- Geometric rectification of the second dated images to the first dated images (image to image registration) to facilitate the overlaying of both images for logical classification. The Root Mean Square (RMS) error⁷ was mostly within one pixel. In a few cases, the error was higher than one pixel due to terrain conditions. In cases of higher RMS errors, images were subdivided into two convenient parts and rectified separately. If images did not match, they were visually interpreted by comparing both images;
- Identification of ‘training areas’ of various land cover types, with emphasis on poppy and cereals, to be classified from the imagery;
- Supervised classification of the land use features of pre-harvest and post-harvest images;
- Logical classification based on pre-harvest and post-harvest classifications;
- Masking of non-agricultural areas;
- Applying 3x3 pixel filtering to the classified images to reduce the noise;
- Assessing the accuracy of the classification process using segment data;
- Calculating poppy cultivation in each cell.

⁷ The Root Mean Square (RMS) error is a measure calculated when registering one image to another image, indicating the discrepancy between known control points in both images. The RMS error provides a guideline for the inaccuracy while performing geometric registration between two images.

Figure 52: Image classification methodology for estimating opium poppy cultivation area



Interpretation of opium poppy cultivation from satellite images

To reduce confusion between opium poppy and cereal fields, two images were acquired over the same area. The first image was acquired during the main opium-growing period, and the second image after the opium harvest. Figure 59 shows an image pair acquired on two different dates. Wheat appears mostly bright red on the first image (full coverage with vegetation shows up as red, bare soil as gray/green), opium poppy fields show faint red. While during the first acquisition there could be some confusion between poppy and wheat, the second acquisition imagery makes feature class separation possible because poppy has been harvested and the fields appear gray/green. The different phenological stages described above, are shown at page 115 (field photographs of poppy, wheat and clover on different dates).

The first and second dates images were classified separately using a maximum likelihood algorithm (figure 60). Opium poppy fields are eventually interpreted as the result of a logical classification technique between the classification of first date and second date images.

Figure 53: Pre- and post-harvest satellite imagery



Garmser, Helmand (23 Apr. 2006)



Garmser, Helmand (03 Jun 2006)

Figure 54: Classification results from pre- and post-harvest imagery



Logical Classification

Once each image had been classified, the classes of the first date image were crossed with the classes of the second date image. This allows logical classification resulting in a thematic map indicating the opium poppy fields. The look-up table shows an example of the combination between feature characteristics between the pre-harvest and post-harvest images. Segment (ground reference) data helped to resolve conflicts in the classification decision logic. The look-up tables are region-specific due to unique local environmental conditions, image acquisition dates and poppy growth cycle.

Table 44: Example of logical classification look-up table (Hilmand Province, Garmser district)

		Post-harvest classification				
Pre-harvest classification		Vegetation	Other	Wheat	Fallow	Nonagri
	Poppy	Other	Other	Other	Poppy	Poppy
	Wheat	Other	Other	Wheat	Wheat	Wheat
	Other	Other	Other	Other	Other	Other
	Fallow	Other	Other	Other	Fallow	Nonagri
	Water	Water	Water	Water	Water	Nonagri
	Nonagri	Other	Other	Other	Nonagri	Nonagri

The thematic images were simplified using a low-pass mode filter prior to extracting the final poppy cultivation area. A mode filter (3x3 window size) is commonly used to remove outliers from a classification while maintaining the integrity of the classification.

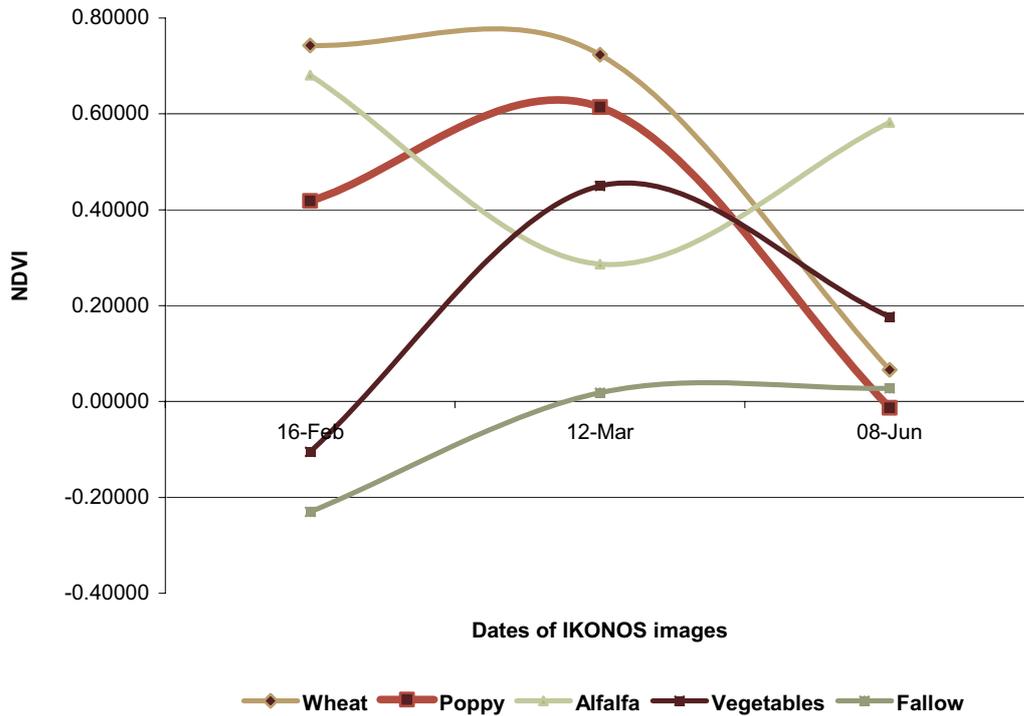
Figure 55: Final classification results



Once the logical classification was completed, the area statistics for each cell were used to calculate the provincial level cultivation estimate

Figure 56: Illustrations of opium poppy, wheat and clover growth cycles

 February 21, Poppy, Emergent Stage	 February 21, Wheat, Emergent Stage	 February 21, Clover, Emergent Stage
 March 13, Poppy, Cabbage Stage	 March 13, Wheat, Cabbage Stage	 March 13, Clover, Cabbage Stage
 April 7, Poppy, Steam Elongation	 April 7, Wheat, Steam Elongation	 April 7, Clover, Steam Elongation
 April 19, Poppy, Flowering Stage	 April 19, Wheat, Flowering Stage	 April 19, Clover
 May 5, Poppy, Lancing Stage	 May 5, Wheat, Maturity Stage	 May 5, Clover
 May 21, Poppy, Lancing completed	 May 21, Wheat, Senescing	 May 21, Clover
 June 06, Poppy Field ploughed	 June 06, Wheat Harvest Completed	 June 06, Clover, Harvested

Figure 57: Spectral reflectance of Poppy and Other crops

Above figure illustrates the spectral characteristics (NDVI) of poppy and other crops between February and June. Wheat and opium poppy have the same kind of vegetation cycle between March and June as can be observed in the figure. The spectral differences between these two crops are higher in the earlier stages. Farmers plough poppy fields right after the harvest, whereas wheat remnants are still in the field. This explains the collection of two date images for the same location, one before harvest and one after harvest.

Area estimation from satellite imagery

The poppy area figures obtained from classification of two-date IKONOS images were subjected to a 'bias correction' using ground reference data. The bias correction methodology is explained subsequently in a separate section.

Ratio estimation formulae were used to estimate the extent of the poppy cultivation at the province level using equation 1 and equation 2.

Equation 1: Estimation of poppy cultivation within each cell

$$\bar{p} = \sum x / X$$

where,

- \bar{p} = Average proportion poppy cultivation in province
- x = Total poppy area in each cell
- X = Total agricultural area in cell

To estimate the total poppy in the province, Equation 2 was used:

Equation 2: Estimation of total opium poppy cultivation

$$\hat{X} = \bar{p}N_A$$

where,

\hat{X} = Total poppy area in province

N_A = Total agricultural area (sampling frame) in province

The results for provinces with more than 5 cells selected were refined by the bootstrap method with 10,000 iterations. The main reason for using bootstrapping is to calculate the standard error of the estimator. The sample items having different size (the total agricultural land differing in each cell), it is not appropriate to calculate the standard error using simple random formulae. The bootstrap technique does not have a significant effect on the estimation of the mean. In provinces with less than five cells, the smaller sample size did not allow bootstrapping. For these provinces, the simple random sampling formulae were applied.

Bootstrapping with 10,000 iterations found a 90% probability that the area under opium poppy cultivation (estimated from satellite imagery) was between 145,540 ha and 175,540 ha, with a mean estimate of 160,540 ha. It should be noted that the upper and lower estimates do not lie symmetrically around the mean estimate obtained for these 15 provinces because of the use of the bootstrap method. The mean estimate for the 19 provinces where a satellite survey was conducted, represented 95% of the total area under opium poppy cultivation in 2006.

Accuracy assessment

Ground reference data were used to develop an understanding of the satellite images for image interpretation and for assessing the classification accuracy.

Ground reference data were collected from selected locations covering 250x250m in 110 cells. These locations are henceforth referred to as 'segments'. Three to four segments were randomly selected over the agricultural area in each of the 110 cells. The surveyors visited these segments to collect detailed information in each parcel. This work was carried out by 8 teams comprising of a total of 58 surveyors, trained by UNODC. Most of the surveyors trained and assigned to the segment survey already had experience in conducting such a survey due to their participation in the 2005 segment survey. The information collected during the segment survey included crop type, plant height, GPS coordinates and photographs.

Due to the security constraints, only 293 of the planned 359 segments could be surveyed, e.g. no segments could be surveyed in Zabul province. Each survey team was equipped with an orientation map to assist locating segments in 110 cells, as well as a detailed segment map showing individual land parcel and a manual with instruction for ground data collection, prepared jointly by UNODC and Cranfield University, UK.

Table 45: Total number of segments surveyed

Province	No of segments	
	Selected	Surveyed
Badakshan	17	13
Badgish	8	8
Baghlan	14	10
Balkh	24	22
Daykundi	4	3
Farah	19	15
Faryab	18	18
Ghor	19	16
Helmand	52	36
Hirat	21	21
Jawzan	8	7
Kandahar	31	23
Kunar	12	12
Laghman	12	12
Nangarhar	36	34
Nimroz	9	6
Samangan	12	11
Saripul	14	7
Uruzgan	24	19
Zabul	5	0
	359	293

The following confusion matrix indicates the producer's accuracy (horizontal) and the user's accuracy (vertical). The producer's accuracy indicates that 80% of the pixels classified as poppy by the computer were found to be actually opium poppy (on the ground), whereas the user's accuracy indicates 85% of the area identified as poppy on the ground were correctly classified as opium poppy using satellite images. The overall accuracy of the classification for all classes was 81%.

Table 46: Confusion matrix for all blocs

		Classification of satellite images				
		poppy	wheat	other	Total	Producer's Accuracy
Ground Reference Data	poppy	1006173	151532	94024	1251729	80%
	wheat	123084	954309	140512	1217905	78%
	other	48752	54322	703956	807030	87%
	Total	1178009	1160163	938492	3276664	
	User's Accuracy	85%	82%	75%		81%

BIAS CORRECTION

The confusion matrix of each final classification was used to remove the bias in the area estimation based on satellite imagery (i.e. the results are adjusted to the reference obtained through ground truthing). The bias correction improves the area estimations by calculating the probability of each ground class with respect to the corresponding spectral class. Details of the calculation of the bias correction were given in the 2005 Annual Opium Survey report.

Figure 58: Segment Data Collection, Kandahar, 2006



3.2 Area Frame Sampling Tools (FST) methodology for cultivation estimation (trial)

A Trial basis implementation of the Frame Sampling Tools (FST) methodology was done implemented in collaboration with Cranfield University, U.K.

Area Frame Sampling is a statistical methodology to enable the accurate survey of a material(s) of interest (MOI), in this case opium poppy fields, over an area of regard, called the area frame (the total agricultural area of Afghanistan), e.g. poppy fields are MOI in Afghanistan in this case. Opium poppy fields distributed in uneven and random manner all across the land. The estimation of opium poppy in a short time window in over a large region is therefore a challenging task. The FST methodology allows mapping of the MOI (i.e. opium poppy) using a small number of randomly selected samples (using of very high resolution data) and extrapolates its probability of occurrence over the larger area (using coarse resolution data).

Opium poppy monitoring in Afghanistan was tested using the above-mentioned principle. Disaster Management Constellation (DMC) satellite data (30 m resolution, 600 km swath) was used for the preparation of an agricultural mask, which defines the area frame. The agricultural areas identified in the DMC images were further subjected to an unsupervised classification to generate a strata map.

Ikonos/Quickbird satellite images (PAN sharpened) and aerial photographs were used to visually interpret 1x1 km samples distributed over large area to identify opium poppy fields. Two classes were interpreted, namely, opium poppy and other crops. These interpreted maps were used along with the strata map (prepared from DMC) to estimate the probability of occurrence of opium poppy in each of the stratum. The percentage of opium poppy in each stratum was determined with the bootstrap method by performing 10,000 iterations. Thus, a matrix showing strata number, probability of occurrence and pixel count was generated. This information is then used to determine the total area of opium poppy in the entire region covered by the strata map (coarse resolution satellite data). As a next step, a fractal map can also be generated based on these results, which shows the probability of occurrence of opium poppy in each stratum. This map can be reclassified by grouping the probabilities, to generate a map showing distribution of opium poppy. It should be noted that this distribution map is based on probabilities of occurrence, and will therefore only show the probability of opium poppy to be found in a certain location, not the actual spatial distribution of opium poppy fields.

Prerequisites and resources required for the implementation of the FST methodology:

- Coarse resolution data (used for generation of strata map) and very high resolution data (used for interpretation of MOI) should perfectly overlap.
- Since area estimation is involved, orthorectification of satellite data is a must
- Access to high resolution DEM of the entire country
- Access to ortho-base i.e. high resolution orthorectified images
- Visual interpretation vs. digital interpretation

Appropriate image enhancement is the key for successful interpretation of high resolution satellite data for precise identification of the matter of interest. In the case of opium poppy identification, the visual interpretation of the MOI using very high resolution satellite data calls for an improved better PAN sharpening. PAN sharpening of Ikonos data often does not provide good results due to saturation of reflectance in the near-infrared range (NIR) range. Therefore, there is a need to reduce the effects of the NIR reflectance while carrying out PAN sharpening using the IHS method. Such improved PAN sharpened products offers good interpretability of opium poppy. The interpretation of small size samples (1x1 km) offer greater control over image interpretation for identifying opium poppy. Interpretation errors can be reduced as the method requires only one class, opium poppy, to be identified and delineated based on a simple yes/no decision. Digital interpretation, although effective, is highly complex and all spectral variability needs to be taken into account in order to get relevant classes. Digital interpretation also calls for high level of technical expertise.

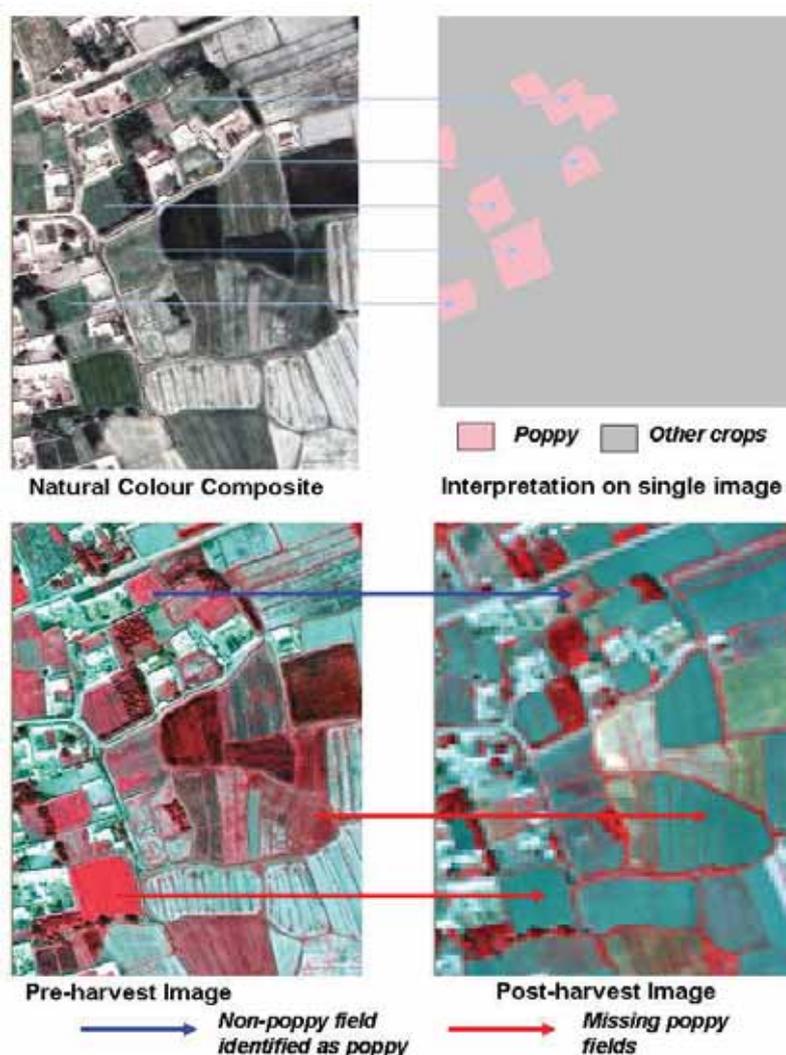
Advantage of two date images

Visual interpretation of single date very high resolution image was an easy task in Hilmand, and Kandahar and Nangarhar provinces. It is attributed to the larger field sizes and timely acquisition of the images. Interpretation of images in Farah and Balkh was a more difficult task since the spectral signatures of opium poppy were not as unique as they were in Hilmand, Kandahar and Nangarhar. Therefore, the second (post-harvest) image was useful in confirming whether the opium poppy identified on the first image was indeed opium poppy correct. Therefore, image acquisition at two different time periods (pre and post-harvest) is proved to be essential in those cases.

Table 47: Comparison of results from the current method and the FST method

Province	UNODC Current methodology	Comments	FST Trial	Comments
Hilmand	69,324 ha	Estimation based on analysis of 13 images of 10x10 km size	65,574 ha	59 samples of 1x1 km size extrapolated using 30 strata of DMC image
Kandahar	12,619 ha	Estimation based on analysis of 7 images of 10x10 km size	11,361 ha	35 samples of 1x1 km size extrapolated using 30 strata of DMC image

Figure 59: Advantage of two dated images, Kandahar, 2006



3.3 Village survey methodology

The Village Survey activities (training, deployment, data collection etc.) were carried out from March 2006 to June 2006 by 128 local field surveyors in all provinces. It was jointly supervised by the Ministry of Counter-Narcotics (MCN) and UNODC. The surveyors were selected on the basis of their experience in opium poppy surveys, knowledge of local customs and their acceptance by local communities. Security was generally problematic for the surveyors, but selection of the surveyors from the corresponding region helped to reduce the security risks.

A stratified sampling method was used to select the villages. The results of previous surveys show that opium poppy cultivation is most successful at altitudes below 1500m, where it is significantly more widespread than in areas of higher elevation, whereas opium poppy cultivation above 2500m is comparatively rare. In view of the uneven distribution of opium poppy cultivation at different elevations, a stratified sampling method was used to select the sample villages. The villages in the sampling frame were divided into three groups (strata) according to their elevation:

Group 1: Villages located at an elevation of less than 1500m

Group 2: Villages located at elevations between 1500m and 2500m

Group 3: Villages located at an elevation of more than 2500m

The surveyor training began in March 2006 and was conducted by the national staff of UNODC. The Ministry of Counter Narcotics also participated in all the training sessions. The training included practical (use of GPS, area calculation, etc) and theoretical aspects (questioning and dialogue with the village headmen and farmers).

Zone	Training date
Eastern zone	12-14 March 2006
Southern zone	23-26 March 2006
Northern zone	30 March to 1 April 2006

Opium poppy cultivation estimated through the sample village survey eventually accounted for 5% (16% in 2005) of the total area under opium poppy cultivation in 2006.

Following data were collected for all villages surveyed:

- Total number of families & inhabitants living in the village
- Total number of families growing opium poppy
- Poppy planting & harvest dates
- Farmer estimates of wheat & opium yield
- Prices for wheat & opium
- Number of opium addicts
- Economical status of farmers
- Reasons for cultivation/non-cultivation of poppy
- Extent of opium poppy and wheat cultivation

Surveyor Training in Nangarhar, March 2006



Establishment of the sampling frame for the village survey

In 2006, the sampling frame for the village survey data was the complete list of all villages in Afghanistan. The village database used to establish the sampling frame was obtained from Afghanistan Information Management System (AIMS), which consisted of 30,706 villages.

Sampling ratio

Villages were selected from each group using a systematic random selection technique. The total sampling ratio was 5.0 % percent. The villages were first stratified based on their location on a cover map, and then randomly selected within each strata:

Strata	Elevation (meters)	Total no. of villages	No. of villages selected	% Villages selected	No. of villages surveyed	% villages surveyed
Group 1	< 1,500	10,253	613	5.98%	594	5.79%
Group 2	1,500-2,500	11,653	612	5.25%	625	5.36%
Group 3	> 2,500	8,800	342	3.89%	335	3.81%
		30,706	1,567	5.10%	1,554	5.06%

The surveyors conducted structured interviews with the two farmers (one poppy grower and one non-poppy grower) and ‘headmen’ of selected villages in each district. A total of 1,554 villages in 323 districts were surveyed across all provinces. Surveyors conducted interviews with 3,154 farmers and 1554 headmen. For the 15 provinces not covered by satellite imagery, opium poppy cultivation estimates were derived from ground survey findings.

Area estimation formula from village survey

Stratified random sampling formulae have been used to calculate opium poppy cultivation from the village survey for the 15 provinces where no satellite images were acquired. Only 4,460 ha opium poppy cultivation observed in these provinces.

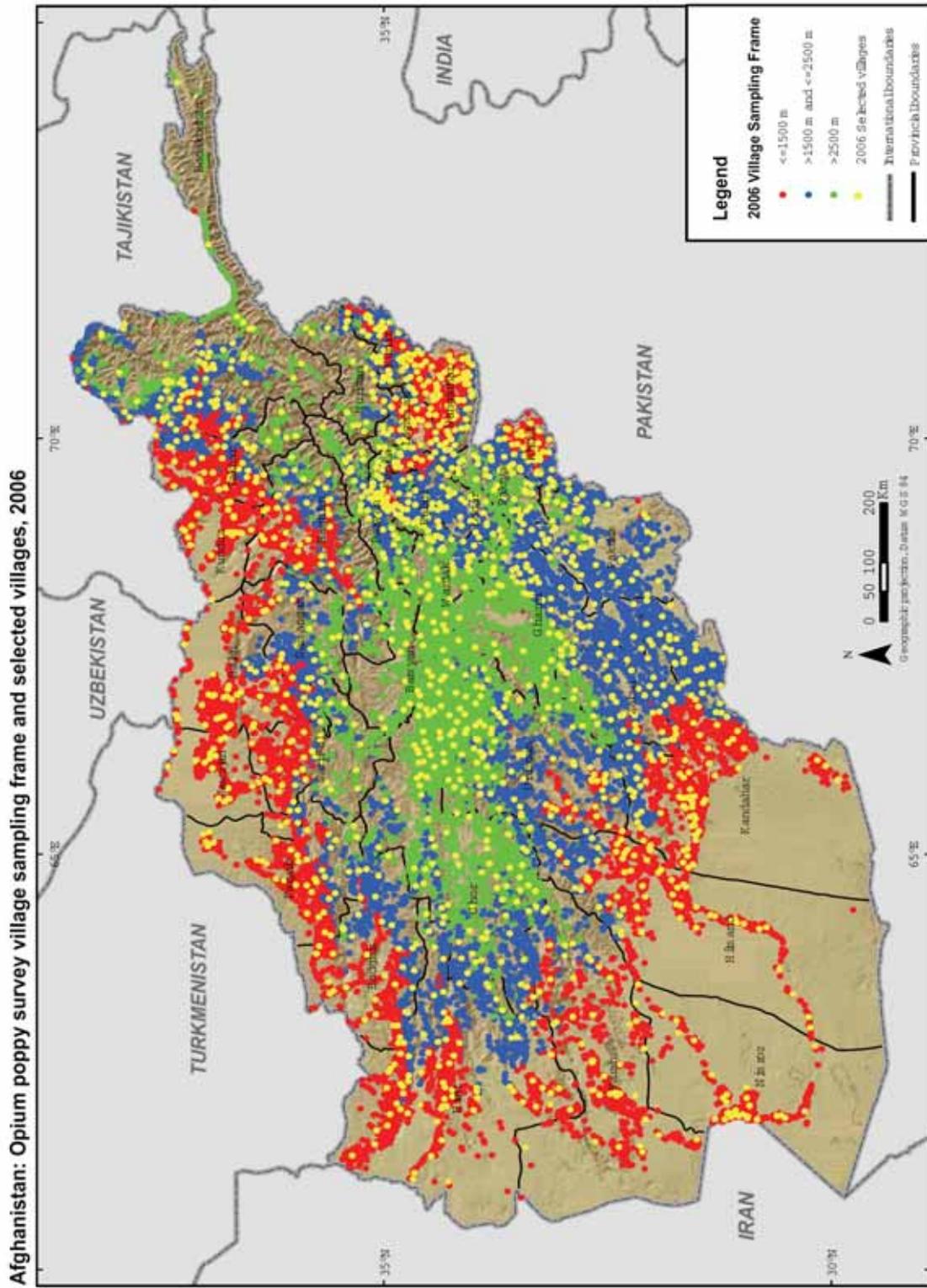
\bar{x}_s = Provincial average of the surveyor’s estimation of opium poppy cultivation per village in strata’s

N_s = Total number of villages per province of strata’s

$$X = \sum_s N_s * \bar{x}_s = \text{Total opium poppy cultivation area}$$

As the agricultural land varies from one village to another, these results were also refined by bootstrapping the provincial samples (with 10,000 iterations). The bootstrap method also provided for the standard error of the estimates. There was a 90% probability that the area under opium poppy cultivation was between 3,860 ha and 5,060 ha, with a mean estimate of 4,460 ha (the upper and lower estimates do not lie symmetrically around the mean estimate because of the bootstrap method used). The mean cultivation area estimate for the 15 provinces, derived from the village survey, represented 5% of the total area under opium poppy cultivation in 2006.

Overall, the area estimation from satellite and village survey ranged between 150,000 ha and 180,000 ha, with a mean estimate of 165,000 ha.



3.4 Opium Yield and Production

In the past, calculation of opium yield in Afghanistan relied on farmers' interviews, mostly done prior to the harvest. The data thus reflected primarily the farmers 'expected' opium yield rather than the actual opium yield which was still unknown at the time of the survey. Data were also subject to the farmers' own bias.

Since 2000, UNODC has been developing an alternative objective yield assessment approach, based on the measured volume of opium capsules and cultivation density⁸. The relationship between capsule volume per square metre and the yield of dry opium was originally developed from data collected in Pakistan and Thailand. It takes the form of a non-rectangular hyperbola:

Non-rectangular hyperbola formula for predicting opium yield

$$Y = [(VC + 1495) - ((VC + 1495)^2 - 395.259 VC)^{0.5}] / 1.795$$

where,

Y = Dry opium gum yield (kilograms / hectare)

VC = Mature capsule volume (cm³/m²)

Data Collection

In 2006, capsule measurements were collected from 714 field (160 fields in 2005) in 320 villages randomly selected throughout the country. A total of 25,355 (4,121 in 2005) capsules were measured from 2,330 plots. In the central and eastern regions, it was difficult to find any poppy fields this year.

For the yield survey, the procedure as described in the UNODC Guidelines for Yield Assessment was followed. An imaginary transect was drawn, along which three one-meter square plots were selected. From each plot, the number of flower buds, flowers, immature capsules and mature capsules that were expected to yield opium were counted, and the diameter and height of 10 to 15 opium yielding capsules were measured with a calliper. With these data the capsule volume per square meter was calculated and input into a non-rectangular formula for the yield calculation. Each plot thus provided one yield observation. The simple average of the observations gave the regional yield estimate.



Yield Survey Training, 2006

⁸ UNODC Guidelines for yield assessment of opium gum and coca leaf from brief field visits, UN New York, 2001, ST/NAR/33

3.5 Opium Price

Between April and August 2006, data were collected on the price of fresh and dry opium. In the 2006 village survey some 3,100 farmers in 1,554 villages were interviewed to provide data on fresh and dry opium prices. The average regional values for price of dry opium were used to estimate the total value of opium produced in Afghanistan in 2006.

Since November 2002, UNODC conducts maintains an regular opium price monitoring system. , collecting prices of fresh and dry opium are collected from farmers and traders on a monthly basis in Nangarhar, Hilmand and Kandahar, and since May 2005 also in Hirat, Balkh and Badakhshan provinces and since January 2006 in Faryab, Kunduz, Takhar, Laghman, Kunar, Farah and Ghor. About 180-200 farmers and 170-190 local traders are interviewed each month to provide this information.

3.6 Opium Growing Families

To estimate the number of families involved in opium poppy cultivation in Afghanistan, data were collected during the village survey on the number of families growing opium poppy in the sampled villages.

Stratified simple random sampling formulae were used to derive the number of opium growing families in Afghanistan as follow:

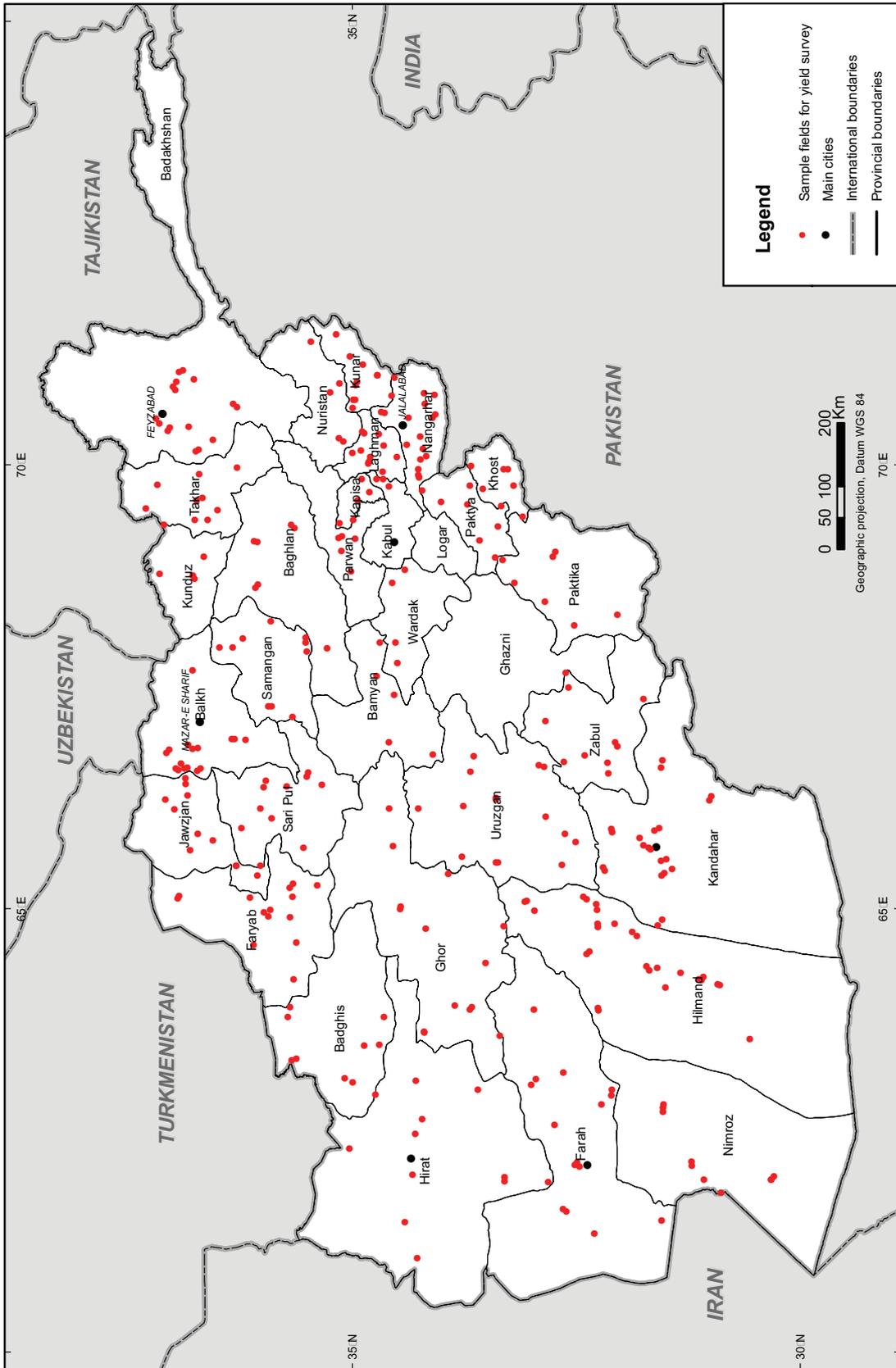
\bar{x}_s = average number of opium poppy growing farmers per village in the sample in strata s

N_s = Total number of villages in the sampling frame in strata s

$X = \sum N_s * \bar{x}_s$ = Total number of families growing opium

As the sampled villages did not have a similar population size, the results were refined with a bootstrap of 10,000 iterations, providing an estimate for the mean and for the standard error. A total of 448,000 poppy (range 395,000 – 501,000) growing households were estimated in Afghanistan.

Sample fields for opium poppy yield survey, 2006



Source: ICN - UNODC Afghanistan Opium Survey 2006
 Note: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

3.7 Value of Opium Production at Farm gate level

Based on the area under cultivation (A) (165,000 ha), the yield (Y) (37 kg per ha of dry opium) and the opium prices (P) (US\$125; weighted by production) the farm-gate value of the opium harvest has been estimated (A x P x Y) at around \$760 million. This figure is equivalent to the potential gross income of farmers from opium production. It does not take into account the costs of farmers related to hiring labour, using fertilizers, accepting a lower income as a result of selling the harvest in advance (salaam arrangements), paying taxes to local commanders or bribing officials for not eradicating the opium poppy harvest.

Table 48: Farm-gate value of opium production in 2006

Region	Production of dry opium in kg	Price of dry opium per kg in US\$	Farmgate value in million US\$
Southern	3,703	122	451.8
Northern	945	99	93.6
North-Eastern	590	125	73.8
Western	537	150	80.6
Eastern	304	191	58.1
Central	8	207	1.7
Total	6,087	125	760
Total rounded	6,100		
90% confidence interval	5,520-6,680	+/- 2.6	690-830

In order to estimate the confidence interval of the farm-gate value, the confidence intervals of all parameters (area under cultivation, yield, prices) were calculated separately.

The combination of the 'uncertainties' (u) of the different variables, was based on the following formula⁹:

$$u(y(x_1, x_2, \dots)) = \sqrt{\sum_{i=1, n} c_i^2 u(x_i)^2}$$

where $y(x_1, x_2, \dots)$ is a function of several parameters x_1, x_2, \dots (here: area, yield, price), and c_i is a sensitivity coefficient evaluated as $c_i = \frac{\partial y}{\partial x_i}$, the partial differential of y with respect to x_i . For simple products ($y = p \times q \times r \dots$) and an independence of the variables used (i.e. the yield per ha is not a function of the area under cultivation or the price paid to farmers), the formula could be simplified as follows:

$$u_c(y) = y \cdot \sqrt{\left(\frac{u(p)}{p}\right)^2 + \left(\frac{u(q)}{q}\right)^2 + \dots}$$

where $(u(p) / \bar{p})$ etc. are the uncertainties in the parameters, expressed as relative standard deviations. In order to arrive at the combined confidence interval of the farm-gate value, the calculated standard deviations are then multiplied with the appropriate z-value.

⁹ EURACHEM/CITAC, Guide CG4, *Quantifying Uncertainty in Analytical Measurements*, 2nd Edition, 2000, UK/Switzerland;
http://www.measurementuncertainty.org/mu/guide/index.html?content_frame=/mu/guide/stepcalculating.html

Given the fact that the confidence intervals for the individual parameters have already been calculated, a further simplification is possible. Instead of using the 'standard deviation' as a percentage of the mean of the respective parameters as inputs for the calculation of the formula shown above, before multiplying the final results with the respective z-values, the 'differences between the mean value and the upper and lower limits of the confidence interval', expressed as a proportion of the mean value of the parameter, can be used as input for the calculation of the overall confidence interval.

Following these considerations, the calculation was done as follows:

a) *Calculation of individual minimum and maximum values:*

The results, based on 90% confidence intervals, showed the following results:

	Average	Minimum	Maximum
A Area under cultivation (ha):	165,000	150,000	180,000
Y Yield (kg/ha)	37	36	38
P Dry opium farm-gate price (US\$/kg)	125	122.4	127.6

b) *Calculation of the distance between the minimum (maximum) limit and the mean of the confidence interval, expressed as a proportion of the mean value of the respective parameter*

	Minimum	Maximum
	$\frac{\text{Min}(X) - \text{Avg}(X)}{\text{Avg}(X)}$	$\frac{\text{Max}(X) - \text{Avg}(X)}{\text{Avg}(X)}$
A = Area under cultivation (ha):	-9.09%	+9.09%
Y = Yield (kg/ha)	-2.70%	+2.70%
P = Dry opium farm-gate price (US\$/kg)	-2.08%	+2.08%

c) *Calculation of the lower (upper) limit of the overall confidence interval:*

$$\sqrt{\sum_{X=A,Y,P} \left(\frac{\text{Min}(X) - \text{Avg}(X)}{\text{Avg}(X)} \right)^2}$$

$$\sqrt{\sum_{X=A,Y,P} \left(\frac{\text{Max}(X) - \text{Avg}(X)}{\text{Avg}(X)} \right)^2}$$

$$= (9.09\%^2 + 2.70\%^2 + 2.08\%^2)^{(1/2)} = +/- 9.7\%$$

The 90% confidence interval for the farm-gate value of the 20065 harvest in Afghanistan is thus:

$$\begin{aligned} & \text{US\$760 mio} \times (1-9.7\%) - \text{US\$760} \times (1+9.7\%) = \\ & = \text{US\$686 million} - \text{US\$834 million} \end{aligned}$$

or rounded: **US\$690 million – US\$830 million**

3.8 Value of Afghan Opiates in Neighbouring Countries

Opiates are usually trafficked by Afghan traders to neighbouring countries. In general, Afghan traffickers are involved in shipping the opiates across the borders. From there onwards, traffickers from neighbouring countries take over the consignments. The value of the opium production (partly transformed into morphine/heroin) in neighbouring countries close to the borders with Afghanistan is thus considered to be a good proxy for the overall gross income made by Afghan citizens from the opium sector.¹⁰ The approach taken to calculate such an income has remained largely unchanged as compared to previous years in order to guarantee direct comparability of the results.

The calculation has followed the following steps:

- establishment of an appropriate conversion ratio of opium into heroin;
- establishment of a distribution pattern of opium production between (i) opium destined for exports and (ii) opium destined for transformation into heroin & morphine;
- establishment of a distribution pattern of (i) opium exports and of (ii) heroin & morphine exports;
- analysis of opium prices as well as of heroin & morphine prices in neighbouring countries in border regions with Afghanistan;
- using prices in neighbouring countries in the border regions with Afghanistan and the distribution pattern to calculate an average weighted export opium price and an average weighted heroin/morphine price;
- multiplying opium export volumes with export prices of opium to arrive at the value of opium exports and (ii) multiplying heroin & morphine export volumes with heroin and morphine export prices to arrive at the value of heroin and morphine exports.

Conversion of opium into heroin

The first question relates to the amounts of opium needed to produce 1 kg of heroin. Traditionally a 10:1 rule of thumb ratio has been used (10 kg of opium for 1 kg of heroin). Previous research showed that such a transformation ratio is correct for many opium producing countries, notably in countries of South-East Asia which until the early 1990s used to dominate global heroin production.

Afghanistan, however, is different. Dating back to the late 1950s, the analysis of an opium sample showed already a morphine content of almost 17%. Authorities in the Kyrgyz Republic reported that the morphine content of opium trafficked through their country (in general, originating in Afghanistan) ranged from 14% to 22%, with a typical morphine content of 18% (ARQ, 2001).¹¹ Over the 2000-2003 period, UNODC collected opium samples across Afghanistan, dried them and analyzed the morphine content of these samples. Overall 39 opium samples from 29 test fields across Afghanistan were collected. The morphine content of dry opium in these samples ranged from 8% to 24%. The highest morphine yields over the 2000-2003 period were found in Badakshan (on average slightly more than 16%¹²). The average morphine content of fields in Nangarhar was above 15%. The average morphine content in Hilmand was above 12%. The average morphine content from the 39 samples in Afghanistan was 15% (confidence interval:

¹⁰ There are, of course, also traders from neighbouring countries (notably from Pakistan, Iran and Tajikistan) purchasing opiates in Afghanistan and smuggling them across the border. Similarly, some Afghan traffickers are involved in shipping the opiates from Afghanistan to the main transshipment markets, located further inland in neighbouring countries. These effects are considered to offset each other.

¹¹ UNODC, *Limited Opium Yield Assessment Surveys, Technical report: Observations and findings, December 2003.*

¹² There was, however, a clear downward trend in the morphine content of opium in Badakshan; while the average morphine content was 18% in 2000 and 17% in 2001 it fell to 11% in 2003. This went hand in hand with a marked increase in the use of irrigated land for poppy cultivation (instead of rain-fed land), a strong increase in yields per hectare and a strong decline of opium prices, far below the national average.

13.7%-16.3%).¹³ This suggested that in Afghanistan, on average, only 6 to 7 kg of dry opium were needed to produce 1 kg of heroin.¹⁴

Table 49: Average morphine content of opium in Afghanistan (2000-2003)*

Province	Average morphine content
Badakhshan	16.2%
Nangarhar	15.3%
Hilmand	12.4%
Others (Kandahar, Balkh)	11.2%
<i>Unweighted average</i>	<i>15.0%</i>
<i>Confidence interval ($\alpha=0.05$)</i>	<i>13.7%–16.3%</i>

* Information based on the analysis of 39 opium samples from 28 fields.

Source: UNODC, *Limited Opium Yield Assessment Surveys, Technical report: Observations and findings, December 2003*.

Such a ratio was also in line with ‘recipes’ for morphine/heroin manufacture, made available to UNODC in recent years, which suggested that the typical inputs needed for the production of 1 kg of morphine / brown heroin were typically between 6 and 7 kg of opium, in addition to a number of chemicals.¹⁵ The question remained, however, how ‘representative’ had been such ‘recipes’, quoted in the literature.¹⁶

¹³ UNODC, *Limited Opium Yield Assessment Surveys, Technical report: Observations and findings, December 2003*.

¹⁴ This refers to heroin at 100% purity. In practice, laboratory efficiencies of typically 60%-70% would, of course, require the input of more opium to produce pure heroin. Heroin produced in Afghanistan, however, is not 100% pure; purity levels usually range from 40%-85%, typically slightly above 60%. This results again in a 6:1 or 7:1 conversion ratio of dry opium to heroin. (UNODC, *The Opium Economy in Afghanistan, An International Problem, New York 2003, p. 133*).

¹⁵ UNODC, *the Opium Economy in Afghanistan – An International Problem, New York 2003, p. 135*.

¹⁶ This is a difficult question as only few such recipes are available and have been described in detail. One recipe, dating back to 2001/02, suggested that a typical ratio was 7 kg of opium for 1 kg of morphine base in Afghanistan. According to this recipe, 28 kg of opium, 6 kg of calcium carbonate and 3 kg of ammonium chloride are needed to produce 4 kg of morphine base. (In another conversion process, calcium oxide (lime) is used instead of calcium carbonate.) In order to produce white morphine base, needed for the production of white heroin HCL, some further processing has to take place. For the production of 2.2 kg of white morphine base, 4 kg of dry (brown) morphine base were found to be required, in addition to 3 ½ litres of methanol, 5 litres of sulphuric acid, 0.5 litres of ammonium hydroxide and 3 cups of charcoal. (DEA, *Heroin Laboratories in Afghanistan, April 2002, p. 40*).

In a more recent attempt to establish a better understanding of the heroin manufacturing process, the German authorities, in cooperation with the Counter Narcotics Police of Afghanistan, hired two cooks to produce white heroin for the authorities in 2004. Out of 70 kg of raw opium, the two cooks produced 7.8 kg of morphine base (purity 68%) and, out of this, 3.9 kg of white heroin HCL (purity of 74%). Other substances used in the process included 8 kg of acetic anhydride, 20 kg of ammonium-chloride (NH₄Cl), 20 kg of sodium-carbonate (Na₂CO₃ x 10 H₂O), 1.5 l of concentrated hydrochloric acid, 1 litre of concentrated ammonia solution, 0.15 l of acetone (C₃H₆O), and 6 kg of charcoal (*Bundeskriminalamt, Dokumentation einer authentischen Heroinherstellung in Afghanistan, 2004, pp. 28-30*). The morphine content of the raw opium used (previously seized by the authorities, and defined by the cooks of being of ‘poor quality’) had a morphine content of, on average, 8.5% (range: 6.1% – 11.1%), less than the average morphine content found in UNODC opium samples across the country (average of 15%). Readjusting the production to a hypothetical sample of 15% morphine content it can be assumed that only 40 kg of opium (of 15% morphine content) would have been needed to produce the 7.8 kg of morphine base (equivalent to a 5:1 ratio) or 3.9 kg of white heroin HCL (equivalent to a 10:1 ratio). Given the dominance of ‘brown heroin’ instead of ‘white heroin’ in Afghanistan’s heroin production, it can be assumed that the overall transformation ratio of opium to heroin should fall within a 5:1 to 10:1 range, probably closer to the lower limit (i.e. 6:1 or 7:1). However, this would be still the result of just one singular exercise, based on a hypothetical opium sample.

Against this background, surveyors in the 2005 survey were explicitly asked to find out from their contacts and informants the amounts of dry opium typically needed to produce 1 kilogram of morphine / brown heroin. Given the highly sensitive nature of heroin production in Afghanistan, and the ongoing dismantling of such laboratories, no formal questionnaire was developed in order not to raise unnecessary suspicions and endanger the security of the surveyors. A majority of the surveyors were not in a position to gather such information, possibly indicating an ongoing lack of heroin production know-how in several parts of the country, as well as the sensitive nature of such a question. Most of the surveyors operating in the main heroin producing areas, however, succeeded to obtain such information and quoted typical transformation ratios around **7 kg of dry opium for the manufacture of 1 kg of morphine / brown heroin** in the debriefing sessions. Thus previously obtained information from recipes and through the analysis of opium samples could be confirmed. This conversion rate was subsequently also adopted as UNODC's general transformation ratio for dry opium to morphine/heroin in Afghanistan in 2005. No contradictory information was obtained in 2006.¹⁷

Opium available for export

In order to arrive at the amounts available for export, seizures and local consumption have to be subtracted from the production figures. As total seizures for 2006 are not as yet available, Afghan seizures reported for 2005 are used as proxy. According to information collected by UNODC's Field Office in Kabul, 50 tons of opium and 5.6 tons of heroin & morphine were seized in 2005. Expressed in opium equivalents (using a 7:1 ratio), total seizures were equivalent to some 90 tons.

The calculation of domestic consumption is based on the results of UNODC's Afghanistan Drug Use Survey 2005. The survey results suggest that domestic opium consumption is equivalent to about 90 tons per year .

Table 50: Domestic consumption by opium users

Opium users	No. of users	grams per day	grams per year	Total consumption per year in kg
Male opium users	132,000	1.7	620.5	81,906
Female opium users	16,000	1.2	438.0	7,008
	148,000			88,914

Source: UNODC, Afghanistan Drug Use Survey 2005.

In addition, the survey also found important levels of heroin consumption in Afghanistan by almost 50,000 heroin users. The average quantities given were rather high: 1.4 grams of heroin per day by a male consumer and 0.9 grams by a female user, resulting in a total heroin consumption of 24.7 tons. The problem here relates to the unknown purity levels of the heroin consumed at the retail level. As the survey also asked for the amount of money a drug users would consume per month, an alternative approach was used to arrive at the heroin consumption figures. Annual amounts of funds used by heroin addicts were calculated and then divided by the average heroin price in Afghanistan. This resulted in a more realistic figure of 9.6 tons.

¹⁷ Reports suggest that for the production of white heroin, more opium would be needed - often cited: 15 kg – 20 kg of opium for 1 kg of white heroin; such figures were also quoted in some newspaper articles in Iran in 2006. Similarly, as mentioned in the footnote above, the German Bundeskriminalamt found that out of 70 kg of raw opium 3.9 kg of white heroin HCL were obtained (2004), equivalent to a ratio of 17.9 kg of opium for 1 kg of white heroin HCL. (*Bundeskriminalamt, Dokumentation einer authentischen Heroinherstellung in Afghanistan*, 2004, p. 30). However, the bulk of heroin produced and exported from Afghanistan is still brown heroin.

Table 51: Domestic consumption by heroin users

Opium users	No. of users	Funds spent on heroin per month in Afs	Funds spent per year in Afs	Funds spent per year in US\$	Average heroin prices in US\$ per gram	Heroin in grams used per drug users per year	Total heroin consumption in kg
Male heroin users	46,000	2,400	28,800	587.8	2.95	199.5	9,176
Female heroin users*	3,500					128.2	449
	49,500						9,625

* female users consuming 64.3% of a male users according to the survey.

Source: UNODC, Afghanistan Drug Use Survey 2005.

Taking these domestic leakages into account (90 tons of seizures, expressed in opium equivalents and 156 tons of domestic consumption in opium equivalents) a production of 6100 tons in Afghanistan translates into 5,854 tons of opium available for export, either in the form of opium or transformed into morphine and heroin.

Table 52: Amounts available for export

	In tons	Tons of opium equivalents*	Tons of opium equivalents
Opium production			6,100
Seizures of			
opium	50.048	50.0	
morphine	0.118	0.8	
heroin	5.592	39.1	
Less seizures			-90
Domestic consumption			
opium	88.9	88.9	
heroin	9.6	67.2	
Less domestic consumption			-156
Available for export			5,854

* using a 7:1 ratio of opium to heroin

Sources: UNODC, Afghanistan Drug Use Survey 2005 and UNODC Field Office.

Establishment of a distribution pattern of opium and heroin & morphine exports

Opium production in Afghanistan is primarily destined for export to foreign markets, either in the form of opium or in the form of morphine/heroin. One key question concerns the extent to which opium is transformed into morphine and heroin within Afghanistan. This is an important issue as there is clear evidence of significant morphine and heroin production taking place within Afghanistan:

- In 2003 Afghan authorities dismantled 120 'fixed laboratories' and 30 'movable laboratories', mainly in Hilmand, Nangarhar (notably in Shanwar district) and in Badakshan,¹⁸ accounting for more than 40% of all opiate laboratories dismantled worldwide in that year.¹⁹
- In 2004, 125 clandestine morphine/heroin laboratories were dismantled in Afghanistan, located in various regions of the country: South (Hilmand, Nimroz, Kandahar: 30

¹⁸ Islamic Republic of Afghanistan, *Annual Reports Questionnaire Data for the year 2003*.

¹⁹ UNODC, ARQ/DELTA.

- laboratories), East (Nangarhar: 25 laboratories), North-East (Badakshan: 25 laboratories) and North (Jawzjan & Sari Pul: 18 laboratories; Kunduz 12).²⁰
- Data collected by UNODC's Field Office in Kabul (based on information received from CNPA and ASNF) suggest that 26 full-fledged heroin laboratories were dismantled in 2005.
 - A further 248 (!) heroin processing laboratories were dismantled over the January-August 2006 period, far more than in any previous year (26 in 2005; 78 in 2004; 31 in 2003).²¹
 - Most laboratories continue to be located in the border areas, though a number of laboratories have been found in other locations as well.

Afghanistan is also faced with significant illegal imports of chemical precursors required to produce morphine and heroin. They are often smuggled into the country via Pakistan as well as other neighbouring countries. In Kabul, the authorities seized 300 litres of acetic anhydride in 2004, a further 390 litres in 2005, which could have produced between 100-400 kg of heroin, and so-far some 1,200 litres of acetic anhydride in 2006. Seizures of acetic anhydride in China, India and Turkey – partly linked to Afghan heroin production - amounted to over 16 tons in 2004. The precursor chemicals found in the heroin laboratories in 2004 were reported by the Afghan authorities to have been mainly from China, India, Russia and Hungary while in the morphine producing laboratories precursor chemicals from Korea and Germany were reported.²² A subsequent analysis by a team of German experts from the Bundeskriminalamt found, however, that many of the alleged German precursor chemicals were forged products, with wrong labels put on them (some of them even having spelling mistakes), in order to indicate a high 'quality product' to the clandestine laboratory owners.

Even though the existence of widespread morphine and heroin production within Afghanistan is thus well established, the question as to the extent of such production is more difficult to answer.

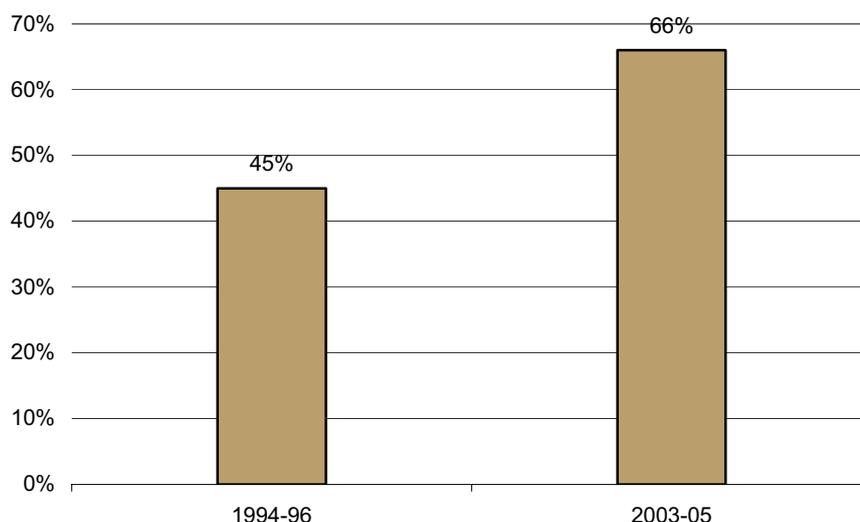
One approach to provide an estimate of the extent of domestic morphine/heroin production is to analyse seizure data in Afghanistan and its neighbours (Pakistan, Iran, countries of Central Asia). As long as there is no substance specific targeting of drug shipments by law enforcement, seizures of opiates – expressed in heroin equivalents – should provide a reasonable estimate of the extent opiates are transformed into intermediary products (morphine) or end products (heroin) within the region. The problem here is that aggregated seizure data for 2006 are not as yet available. Thus a different approach is taken: average annual seizures of opium and of heroin and morphine over the last three years (2003-2005) are used as a proxy for the – so-far - unknown proportion for the year 2006.

The analysis revealed that – expressed in heroin equivalents (using a ratio of 7 kg of opium equivalent to 1 kg of heroin) – one third of opiate seizures in the countries neighbouring Afghanistan (Iran, Pakistan, Central Asia) were in the form of opium over the 2003-2005 period and two thirds in the form of either morphine or heroin, up from 45% over the 1994-1996 period.

²⁰ Islamic Republic of Afghanistan, *Annual Reports Questionnaire Data for the year 2004*.

²¹ UNODC Field Office Kabul, based on information received from CNPA and ASNF.

²² Islamic Republic of Afghanistan (Ministry of Counter Narcotics), *Annual Reports Questionnaire Data for the year 2004*.

Figure 60: Proportion of heroin & morphine in total opiate seizures* in countries neighbouring Afghanistan (Iran, Pakistan, Central Asia)

* based on 7:1 conversion ratio of opium to heroin
 Source: UNODC, Annual Reports Questionnaire Data.

As law enforcement agencies of the countries neighbouring Afghanistan claim that no (or no significant) morphine and heroin production takes place on their territories, the following calculation assumes that two thirds of the opium produced in Afghanistan is transformed into morphine & heroin within Afghanistan.

Table 53: Estimated opium and heroin & morphine exports of Afghanistan in 2006

	Opium production (metric tons)	Opium exports (metric tons)	Heroin & morphine exports (metric tons)
Opium production (2006)	6,100		
Less seizures (2005) in opium equivalents	90		
Less local consumption of opiates in opium equivalents	156		
Opiates available for further processing and exports	5854		
Distribution		33.7%	66.3%
Opium used for purposes		1,972	3,882
Conversion rate dry opium to heroin			7 : 1 ratio
End products – exports		1,972	555

The proportion of Afghan heroin exports is, however, less. Out of total heroin and morphine seizures in countries neighbouring Afghanistan, 71% are in the form of morphine and 29% in the form of heroin, suggesting that – in contrast to official declarations – further processing of morphine into heroin is still taking place in some of the countries neighbouring Afghanistan as well as in subsequent countries along the main trafficking routes.

Distribution pattern of opiate shipments out of Afghanistan

Giving differences in opium and heroin prices in neighbouring countries, the next important question relates to the quantities

Distribution of opium exports

As discussed above, the calculations suggest that some 2000 tons are exported in the form of opium. Based on a three-year average of seizures in neighbouring countries the following patterns emerges:

Table 54: Distribution of opium exports

	Seizures (average 2003-2005)	Opium exported
Iran	95.4%	1,882
Pakistan	2.8%	56
Central Asia	1.7%	34
Total	100%	1,972

Given the strong enforcement efforts by the Iranian authorities, there is probably a potential bias towards seizures made in Iran, and thus an over-reporting of opium exports to Iran. On the other hand, Iran is also the only country in the region where widespread 'opium addiction' is reported. In the other countries of the region, use of other opiates is more widespread. Thus, there is a strong likelihood that the bulk of the exported opium is indeed destined for the Iranian market. This does not exclude the possibility that some of the 2000 tons of opium leave Afghanistan via Pakistan for final destinations in Iran. In such cases, the involvement of Afghan traffickers (often Baluch traffickers) does not necessarily stop across the border in Pakistan but may well continue until the borders of Iran are crossed. In other words, the total gross income for Afghan traffickers does not change much whether Iran is targeted directly, or indirectly via Pakistan.

Distribution of morphine & heroin exports

Applying the same approach to morphine and heroin exports is likely to lead to an under-reporting of opiate shipments via Central Asia where law enforcement capacity is generally regarded to be lower than in other countries of the region.

Table 55: Distribution of heroin and morphine exports

	Distribution based on heroin & morphine seizures (average 2003-2005)	Distribution based on production in Afghanistan (see below)
Iran	31.8%	31.0%
Pakistan	57.2%	47.7%
Central Asia	11.0%	21.3%
Total	100%	100.0%

Against this background, a different approach was taken for heroin and morphine exports, based on the location of opium production. Intelligence information suggests that the bulk of Afghan opiates are exported to the closest external border in order to avoid expensive payments to local commanders who have check-points across the country. There are indications that

- most of the opium produced and transformed into morphine/heroin in central and eastern Afghanistan leaves the country via Pakistan;
- most of the opium produced and transformed into morphine/heroin in north-eastern Afghanistan leaves the country via Tajikistan;

- most of the opium produced and transformed into morphine/heroin in western Afghanistan leaves the country via Iran;
- about half of the opium produced in southern Afghanistan leaves the country via Pakistan, and the rest via Iran. Taking exports of opium into account – which primarily go to Iran (95%), this leaves that some 20% of the heroin & morphine shipments going to Iran; the rest (80%) goes to Pakistan (which is in line with huge heroin & morphine seizures reported from Pakistan);
- about half of the opium produced in northern Afghanistan leaves the country via Central Asia and the other half via Iran. Taking again opium exports into account – which primarily are destined for Iran (95%) – this leaves some 75% of the opium, destined for further processing into heroin & morphine, leaving the country via Central Asia and the rest (25%) via Iran. (Large scale trafficking of opium from northern Afghanistan to southern Afghanistan, as reported in 2005, seems to have lost in importance in 2006 as there was more than sufficient supply of opium in southern Afghanistan and price differences between northern and southern Afghanistan gradually disappeared).

Table 56: Distribution of heroin and morphine based on production estimates

	Distribution	Assumptions	Distribution of morphine/heroin exports based on production estimates
Iran	31.0%	100% West, 30% South, 25% North	172
Pakistan	47.7%	100% East, 100% Central, 70% South	265
Central Asia	21.3%	100% North-East, 75% North	118
Total	100%		555

Prices of opiates in neighbouring countries

The next parameters investigated were the opium and morphine/heroin prices in countries neighbouring countries, notably in the border regions with Afghanistan. Such prices were collected by the UNODC field offices, located in Pakistan, Iran and in Central Asia. Prices in border areas of Tajikistan were used as a proxy for prices in border areas of Central Asian countries.

Opium prices (per kilogram)

Iran (August-September 2006):

Eastern region (Sistan Baluchestan):	US\$650 per kg;
Tehran	US\$1,200 per kg (retail: US\$1.5/gram)
Western Iran:	US\$1,700 per kg

Pakistan (April-August 2006):

Peshawar:	US\$232 per kg
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Tajikistan (July-August 2006)

Border areas with Afghanistan:	US\$325 (300-350) per kg
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Dushanbe: US\$ 425 (400-450) per kg

Heroin prices (per kilogram)

Iran (August-September 2006):

Eastern region (Sistan Baluchistan): US\$2,200 per kilogram (40%-50% purity)
 Tehran: US\$3,450 per kilogram
 Western provinces: US\$4,900 per kilogram

Prices are, however, not directly comparable with those in Afghanistan due to dilutions with other substances.

Calculation of the purity adjustment ratio:

Afghanistan: brown heroin (base): 68% purity²³
 Sistan Baluchistan: (brown) heroin : 45% (40%-50% purity):
 Purity adjustment ratio: 1.5

Purity adjusted prices in Sistan Baluchistan

(adjusted to Afghan purity levels) **US\$3,300** (US\$2200 * 1.5) per kilogram

Pakistan (May-August 2006):

Peshawar: **US\$3,135** per kilogram

Tajikistan (July-August 2006)

- high-quality heroin prices:

Dushanbe (January-June 2006) US\$4600 (4,500-4,700) per kilogram
 Dushanbe (July-August 2006) US\$4250 (4,000-4,500) per kilogram
 Change: -7.6%

Kathlon (January-June 2006) US\$4,000 per kilogram
 Pamir (January-June 2006) US\$4,250 (4000-4500) per kilogram
 Average (January-June 2006) US\$4,125 per kilogram

Estimated prices over July-August 2006:

Assumed change in drug prices²⁴: -7.6%
 Average (border areas with Afghanistan) **US\$3,810** (4125 * (1-7.6%)) per kilogram

²³ Bundeskriminalamt, Dokumentation einer authentischen Heroinherstellung in Afghanistan, Wiesbaden 2005.

²⁴ No high-purity heroin prices were collected over the July-August period in the Tajik border regions with Afghanistan; however, low purity heroin prices showed a decline in the border areas. It can be thus assumed that high-purity heroin prices declined as well. The decline reported from Dushanbe is used as a proxy for the likely decline in the border regions.

Results

Combining all the elements discussed above, the calculations result in a likely overall gross income ('value added') of around US\$3.1 billion for Afghanistan (farmers and traffickers) from the opium sector for 2006. This would be equivalent to about 46% of legal GDP (US\$6.7 billion in 2005/06) or 32% of overall GDP in Afghanistan.

Table 57: Estimate of potential total Afghan gross income from the opium sector in 2006

	Opium exports	Opium prices per kg	Opium distribution based on seizures	Heroin & morphine exports	Heroin price per kg	Heroin & morphine distribution based on opium production	Total
Total exports in tons	1,972 mt			555 mt			
Iran		US\$650	95.4%		US\$3,300	31.0%	
Pakistan		US\$232	2.8%		US\$3,135	47.7%	
Central Asia		US\$325	1.7%		US\$3,810	21.3%	
Average export price weighted by distribution		US\$ 633	100.0%		US\$ 3,330	100.0%	
Value in billion US\$ (exports in kg × export price in US\$)	US\$ 1.25 billion			US\$ 1.85 billion			US\$ 3.1 billion

The calculations suggest an average export price for opium of US\$633 per kilograms and for heroin of US\$3,330 per kilogram. Both the average opium price and the average heroin price were thus lower than a year earlier (US\$893 and US\$3,856), reflecting increased production in 2006. Data also suggest that the decline in opium prices was more pronounced (-30%) than the decline in heroin prices (-14%).

Deducting the farmers' income of US\$0.76 billion, the overall gross income for traffickers amounts to US\$2.34 billion in 2006, slightly more than traffickers gross profits in 2005 (US\$2.14 billion). The estimate does not take into account the fact that some Afghan traffickers do not only ship the opium or heroin to the borders of neighbouring countries, but also onwards to major transshipment places where prices are usually far higher. On the other hand, not all of the opiates are smuggled out of the country by Afghan traffickers. Some of the opium and heroin is also being trafficked by traders from neighbouring countries, notably from Pakistan, Iran and Tajikistan, to markets outside Afghanistan. The estimate above assumes that these additional factors more or less offset each other.

Confidence interval

The best available mid-point estimate has been given above. Nonetheless, it must be clear that there could be significant variations, if actual values of the key parameters used were to fall towards the lower or the higher end of the respective ranges. In the following sub-chapter, the 90% confidence interval of the various indicators will be calculated and discussed.

Production (90% confidence interval)

The calculation of the range of opium production was already discussed in the methodology sub-chapter on the value of opium production. Opium production could range from 5,520 to 6,680 tons. Deducting domestic leakages due to seizures and domestic consumption (246 tons), the amounts available for export would range from 5,274 to 6,434 tons.

Based on this confidence interval, Afghan **opium exports could range from 1,777 to 2,168 tons**, and **morphine & heroin exports from 500 to 609 tons**.

Calculation of 90% confidence interval for opium and heroin & morphine exports.

Opium production:

range: 5,520 – 6,680 metric tons (mean: 6,100 tons)

less seizures: 90 metric tons

less local consumption: 156 metric tons

Available for export:

Range: 5,274 – 6,434 metric tons

Opium exports (33.7% of production)

range: **1,777 - 2,168 metric tons** (+/- 9.9% of mean of 1,972 tons)

Heroin & morphine exports (66.3% of production; 7:1 ratio)

range: **500-609 metric tons**; (+/- 9.9% of mean of 555 tons)

The calculation of a confidence intervals for price data in the countries neighbouring Afghanistan has been far more difficult as UNODC is not directly involved in the data collection process and thus does not have the raw data at its disposal. Price ranges, aiming to reflect a 90% confidence interval, have been calculated for neighbouring countries; but they must be treated with caution.

In the case of Tajikistan minimum and maximum prices have been available for opium for the July-August 2006 period. With regard to heroin, they have been only available for the January-June 2006 period. There were, however, indications that not only opium but also heroin prices decreased over the July-August period. Price information of low purity heroin – which declined – was available, but it was not clear to what extent changes in purity levels were responsible for the decline. In order to take the likely price declines into account, changes in heroin prices, identified in other parts of the country were used as a proxy for the likely change in the border areas. There has been, however, no possibility to evaluate the confidence interval arising from this downward adjustment of heroin prices.

In the case of Iran, no ranges for the opium prices in Sistan Baluchistan were reported in 2006. However, time series data of opium price fluctuations for 2004/05 exist. Based on these price fluctuations, a 90% confidence interval of the mean price was established last year. The results were applied to the new price data for 2006.

In the case of Pakistan (Peshawar), no minimum and maximum prices were reported. However, time series data for 2006 exist, which enabled the calculation of a confidence interval.

Prices (90% confidence interval)

Opium prices in Iran (Sistan Baluchistan): US\$624-US\$676; +/- 4% of mean (US\$650)

Opium prices in Pakistan (Peshawar):	US\$214-US\$250; +/- 8% of mean (US\$232)
Opium prices in Tajikistan (border region):	US\$300-US\$350; +/- 17% of mean (US\$300)
Heroin prices in Iran (Sistan Baluchistan): Mean:	US\$2,200
Adjusted for falling purity levels:	
Heroin prices in Iran (Sistan Baluchistan):	US\$2,937-US\$3,663; +/- 11% of mean (\$3300)
Heroin prices in Pakistan (Peshawar):	US\$2,696-US\$3,574; +/- 14% of mean (\$3135)
Heroin prices in Tajkistan (border region):	US\$3750-US\$4,500; +/- 9% of mean (\$4125)
Adjusted for decline in summer months:	
Heroin prices in Tajkistan (border region):	US\$3,470-US\$4,150; +/- 9% of mean (\$3810)

Based on these price ranges and opiate production & export ranges, the following confidence intervals (90%) could be calculated:

- a) Keeping production levels constant and multiplying them with minimum and maximum prices would result in a range of US\$2.8 to US\$3.4 billion;
- b) Keeping prices constant and calculating the confidence intervals based on minimum and maximum production levels, would result in a range of US\$2.8 to US\$3.3 billion;
- c) Calculating the average minimum export prices (US\$607 for opium and 2,995 for heroin), the average maximum export prices (US\$658 for opium and 3,799 for heroin), as well as the minimum and maximum production estimates, and applying the formula shown below, gives a range of the value of the Afghan opiates market of **US\$2.7 to US\$3.5 billion.**

The last estimate is considered to be the best for the overall 90% confidence interval of the figure of US\$3.1 billion. It can be thus stated that the size of the **Afghan opiate industry is equivalent to between 40% and 52% of licit Afghan GDP in 2006**, with the **best estimate** suggesting a proportion **equivalent to 46% of GDP.**

$$= \text{Avg}(j_1) \times \text{Avg}(j_2) \times \left(1 - \sqrt{\sum_{j=1}^2 \left(\frac{\text{Min}(j) - \text{Avg}(j)}{\text{Avg}(j)}\right)^2}\right) \quad (\text{minimum})$$

$$\text{Avg}(j_1) \times \text{Avg}(j_2) \times \left(1 + \sqrt{\sum_{j=1}^2 \left(\frac{\text{Max}(j) - \text{Avg}(j)}{\text{Avg}(j)}\right)^2}\right) \quad (\text{maximum})$$

where j=1 for prices and j=2 for production

= for opium: $US\$1.247 \text{ bn} * (1 - (4.072\%^2 + 9.89\%^2)^{(1/2)}) = US\1.114 bn (min)
 $US\$1.247 \text{ bn} * (1 + (4.072\%^2 + 9.94\%^2)^{(1/2)}) = US\1.381 bn (max)

= for heroin/morphine: $US\$1.847 \text{ bn} * (1 - (10.048\%^2 + 9.83\%^2)^{(1/2)}) = US\1.587 bn (min)
 $US\$1.847 \text{ bn} * (1 + (10.048\%^2 + 9.82\%^2)^{(1/2)}) = US\2.106 bn (max)

= for opiates: minimum: US\$2.7 bn
 maximum: US\$3.5 bn

4 ANNEXES

Annex 1: Opium cultivation in Afghanistan per province, 2002-2006 (hectares)

PROVINCE	2002	2003	2004	2005	2006	Change 2005-2006 (ha)	Change 2005-2006 (%)
Badakhshan	8,250	12,756	15,607	7,370	13,056	5,686	77%
Badghis	26	170	614	2,967	3,205	238	8%
Baghlan	152	597	2,444	2,563	2,742	179	7%
Balkh	217	1,108	2,495	10,837	7,232	-3,605	-33%
Bamyan	-	610	803	126	17	-109	-87%
Day Kundi	-	-	-	2,581	7,044	4,463	173%
Farah	500	1,700	2,288	10,240	7,694	-2,546	-25%
Faryab	28	766	3,249	2,665	3,040	375	14%
Ghazni	-	-	62	-	-	0	0%
Ghor	2,200	3,782	4,983	2,689	4,679	1,990	74%
Hilmand	29,950	15,371	29,353	26,500	69,324	42,824	162%
Hirat	50	134	2,531	1,924	2,287	363	19%
Jawzjan	137	888	1,673	1,748	2,024	276	16%
Kabul	58	237	282	-	80	80	*
Kandahar	3,970	3,055	4,959	12,989	12,619	-370	-3%
Kapisa	207	326	522	115	282	167	145%
Khost	-	375	838	-	133	133	*
Kunar	972	2,025	4,366	1,059	932	-127	-12%
Kunduz	16	49	224	275	102	-173	-63%
Laghman	950	1,907	2,756	274	710	436	159%
Logar	-	-	24	-	-	0	0%
Nangarhar	19,780	18,904	28,213	1,093	4,872	3,779	346%
Nimroz	300	26	115	1,690	1,955	265	16%
Nuristan	-	648	764	1,554	1,516	-38	-2%
Paktika	-	-	-	-	-	0	0%
Paktya	38	721	1,200	-	-	0	0%
Panjsher	-	-	-	-	-	0	0%
Parwan	-	-	1,310	-	124	124	*
Samangan	100	101	1,151	3,874	1,960	-1,914	-49%
Sari Pul	57	1,428	1,974	3,227	2,252	-975	-30%
Takhar	788	380	762	1,364	2,178	814	60%
Uruzgan	5,100	7,143	11,080	2,024	9,703	7,679	379%
Wardak	-	2,735	1,017	106	-	-106	-100%
Zabul	200	2,541	2,977	2,053	3,210	1,157	56%
Total (rounded)	74,000	80,000	131,000	104,000	165,000	61,000	59%

ANNEX 2 Indicative district level estimations of opium poppy cultivation, 1994-2006 (in hectares)²⁵

Province	District	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2,006	
Badakhshan	Baharak	111	64	116	9	202	23	86	345	180		5,544	1,635	710	
	Darwaz													0	
	Fayz Abad	77	2,344	1,592	1,634	1,282	906	1,073	868	2,370	3,109	2,362	3,111	7,154	
	Ishkashim			3										0	
	Jurm	433	555	1,326	1,051	1,198	1,249	773	2,897	2,690	4,502	4,818	1,460	2,027	
	Khwahan													0	
	Kishim	1,093	3	177	62	62	385	507	2,191	2,840	4,530	2,883	1,076	3,165	
	Kuran Wa Munjan													48	0
	Ragh			8	31	2	8								0
	Shahri Buzurg					71	113	19	41	170	615			39	0
	Shighnan														0
	Wakhan														0
	Zebak		4	8	115										0
Badakhshan Total		1,714	2,966	3,230	2,902	2,817	2,684	2,458	6,342	8,250	12,756	15,607	7,369	13,056	
Badghis	Ab Kamari													127	
	Ghormach							20		4	101		944	624	
	Jawand											226	134	431	
	Muqur													220	
	Murghab							21		22	69	345	1,889	1,034	
	Qadis													391	
	Qala-i- Naw											43		378	
Badghis Total		0	0	0	0	0	0	41	0	26	170	614	2,967	3,205	
Baghlan	Andarab								81	31	301	564	548	947	
	Baghlan							152		120	16	154	374	72	
	Baghlani Jadid											81	248	371	
	Burka											198	242	39	
	Dahana-l- Ghor				328	929	967	27			37	200	24	35	
	Dushi											89	116	174	
	Kahmard											527	263	255	
	Khinjan										9	21	92	137	
	Khost Wa Firing										21	0	295	442	
	Nahrin								1		63	276	35	36	
	Puli Khumri						38	20		1	37	173	224	81	
	Tala Wa Barfak										113	161	102	153	
	Baghlan Total		0	0	0	328	929	1,005	199	82	152	597	2,444	2,563	2,742
Balkh	Balkh				13	29	29	82	1	22	332	411	2,786	1,975	
	Chahar Bolak				165	530	2,600	53			68	877	2,701	799	
	Chahar Kint											23	25	16	
	Chimtal			1,065	532	485	1,428	2,451		153	617	258	1,878	2,074	
	Dawlat Abad								3	-		141	202	181	

²⁵ District estimates may not be statistically significant as the sample size at the district level is not appropriate to produce estimates at such level

	Dihdadi							22		8	35	16	990	307
	Kaldar											152	395	123
	Khulm											50	367	0
	Kishindih											111	290	189
	Marmul											3	18	12
	Mazari Sharif											50	119	78
	Nahri Shahi							33		14	30	139	425	833
	Sholgara							28		19	28	256	543	245
	Shortepa											8	98	401
Balkh Total		0	0	1,065	710	1,044	4,057	2,669	4	217	1,108	2,495	10,837	7,233
Province	District	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2,006
Bamyan	Bamyan										20	93	19	17
	Panjab										250	31		0
	Shibar										36	492	107	0
	Waras										191	64		0
	Yakawlang										112	123		0
Bamyan Total											610	803	126	17
Day Kundi	Day Kundi								0	-	836	1,996		1,948
	Gizab	1,476	16	8	0	0	0	0	0	-	776	1,109		1,243
	Kijran								0	-	418	189		1,633
	Shahristan								1	-	415	421		2,220
Day Kundi Total		1,476	16	8	0	0	0	0	1	0	2,445	3,715		7,044
Farah	Anar Dara											91	1,828	143
	Bakwa		1	13	129	31	129	259				39	390	1,093
	Bala Buluk		8	19	169	36	186	183			513	336	1,665	1,669
	Farah			18	18	10	44	73				87	729	905
	Gulistan			581	252	94	428	849			1,187	447	163	202
	Khaki Safed											84	432	537
	Lash Wa Juwayn											41	1,568	215
	Pur Chaman											409	293	363
	Pusht Rod											554	2,482	1,709
	Qalay-I-Kah											189	407	506
	Shib Koh											12	283	352
Farah Total		0	9	631	568	171	787	1,364	0	500	1,700	2,289	10,240	7,694
Faryab	Almar											239	57	338
	Andkhoy											15	13	31
	Bilchiragh							6		26	232	24		322
	Dawlat Abad											78	133	27
	Khani Chahar Bagh											205	6	490
	Khwaja Sabz Posh											129	451	375
	Kohistan											640	50	84
	Maymana							1				248		218
	Pashtun Kot							11		1	281	429	97	60
	Qaramqol											55	138	43
	Qaysar							16			150	1,050	579	880
	Shirin Tagab							3			103	137	1,141	172
Faryab Total		0	0	0	0	0	0	36	0	28	766	3,249	2,665	3,040
Ghazni	Ab Band													0
	Ajristan	313									-	62		0
	Andar													0

	Bahrami Shahid(Jaghathu)												9	0	
	Dih Yak													0	
	Gelan													0	
	Ghazni													0	
	Giro													0	
	Jaghathu													0	
	Jaghuri													0	
	Malistan													0	
	Muqur													0	
	Nawa													0	
	Nawur													0	
	Qarabagh													0	
	Zana Khan													0	
Ghazni Total		313	0	0	0	0	0	0	0	0	0	0	62	9	0
Province	District	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2,006	
Ghor	Chaghcharan									700	1,189	872	1,149	1,233	
	Lal Wa Sarjangal											1,055	718	771	
	Pasaband									700	805	175	48	241	
	Saghar									300	256	340	120	283	
	Shahrak										640	902	18	1,398	
	Taywara									500	808	649	240	608	
	Tulak										84	990	396	145	
Ghor Total										2,200	3,782	4,983	2,689	4,679	
Hilmand	Baghran		2,519	1,267	2,754	2,910	2,794	2,653		1,800	2,309	2,232	2,507	2,890	
	Dishu									-		369	911	851	
	Garmser	786	725	942	1,993	1,205	2,643	2,765		2,020	462	1,922	1,912	6,168	
	Kajaki	979	4,087	2,814	3,904	3,959	5,746	4,625		2,640	1,392	1,676	1,639	6,760	
	Lashkar Gah	2,256	885	1,054	1,325	1,869	2,528	3,145		1,140	605	1,380	1,332	4,008	
	Musa Qala	1,154	5,137	3,924	4,360	5,574	7,013	5,686		3,690	2,455	2,404	1,664	6,371	
	Nad Ali	12,529	5,983	4,035	5,102	5,156	8,667	8,323		5,880	870	4,177	2,356	11,652	
	Nahri Sarraj	590	4,716	4,309	4,807	2,426	4,041	4,378		1,850	1,575	6,486	3,548	10,386	
	Naw Zad	2,345	2,799	3,596	1,585	3,605	4,424	5,085		2,650	3,096	1,051	3,737	2,707	
	Naway-i Barakzayi	6,074	1,254	505	722	1,150	2,581	3,246		2,730	1,240	3,506	2,552	10,168	
	Reg							222		1,940		1,893	2,772	3,765	
	Sangin	2,866	973	1,909	1,971	1,734	2,646	1,711		2,810	777	1,365	1,184	2,862	
	Washer		676	555	877	1,084	1,469	1,014		800	590	892	386	735	
Hilmand Total		29,579	29,754	24,910	29,400	30,672	44,552	42,853	0	29,950	15,371	29,353	26,500	69,323	
Hirat	Adraskan											133	9	99	
	Chishti Sharif											166	42	42	
	Farsi										134	28	110	111	
	Ghoryan											60	238	204	
	Gulran											240	33	32	
	Guzara											88	231	233	
	Hirat											0	16	16	
	Injil											41	394	382	
	Karukh											265	124	121	
	Kohsan											4	72	73	
	Kushk											73	64	50	
	Kushki Kuhna											3	15	15	
	Obe											842	144	131	

	Pashtun Zarghun				38			38			154	249	242	
	Shindand							146			427	54	408	
	Zinda Jan										7	128	129	
Hirat Total		0	0	0	38	0	0	184	0	50	134	2,531	1,924	2,288
Jawzjan	Aqcha						532	208		47	171	247	631	30
	Darzab											625	272	16
	Fayz Abad						43	105		24	280	218	112	473
	Khamyab							6		30	51	40	68	2
	Khwaja Du Koh											19	15	271
	Mardyan						43	111		4	228	174	21	348
	Mingajik						1,789	141		7	64	101	77	38
	Qarqin						186	10		24	58	151	43	17
	Shibirghan							19		1	36	98	508	828
Jawzjan Total		0	0	0	0	0	2,593	600	0	137	888	1,673	1,748	2,023
Province	District	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2,006
Kabul	Bagrami													0
	Chahar Asyab													0
	Dih Sabz													0
	Guldara													0
	Istalif													0
	Kabul													0
	Kalakan													0
	Khaki Jabbar													0
	Mir Bacha Kot													0
	Musayi													0
	Paghman													0
	Qarabagh													0
	Shakar Dara													0
	Surobi						132	340	29	58	237	282		80
Kabul Total		0	0	0	0	0	132	340	29	58	237	282	0	80
Kandahar	Arghandab	211	87	331	561	399	750	459		330	139	261	287	735
	Arghistan						38	13		80	14	651	2,449	784
	Daman						110	50		190	357	895	775	183
	Ghorak	347	803	692	1,503	1,126	1,109	574		380	166	241	233	336
	Kandahar	320	53	234	21	73	227	156		640	293		0	1,367
	Khakrez	362	274	627	286	518	632	320		560	312	145	185	217
	Maruf	30	16	1		3	5	17		-	63	117	150	464
	Maywand	256	333	618	1,278	2,497	2,022	995		1,090	353	514	1,281	1,362
	Panjwayi	250	357	266	255	134	132	184		150	482	864	4,687	4,714
	Reg											0	327	
	Shah Wali Kot	678	97	94	127	162	236	238		260	489	923	2,379	1,593
	Shorabak										111	45	19	409
	Spin Boldak	1,170	107	194	91	317	261	26		290	277	303	218	454
Kandahar Total		3,624	2,127	3,057	4,122	5,229	5,522	3,034	0	3,970	3,055	4,959	12,990	12,618
Kapisa	Alasay											77	82	0
	Koh Band											111	33	0
	Kohistan											116		0
	Mahmud Raqi											10		0
	Nijrab											92		0
	Tagab						5	104	0	207	326	116		282
Kapisa Total		0	0	0	0	522	115	282						

Khost	Bak											0		14
	Gurbuz											47		10
	Jaji Maydan											8		16
	Khost(Matun)											0		0
	Mando Zayi											125		0
	Musa Khel											86		0
	Nadir Shah Kot											75		0
	Qalandar											39		0
	Sabari											0		0
	Spera										118	0		5
	Tani							6			257	458	2	88
	Tere Zayi											0		0
Khost Total		0	6	0	375	838	2	133						
Kunar	Asad Abad						73	239	1	140	396	841	270	356
	Bar Kunar						47	72	31	40	163	52	14	10
	Chapa Dara											535	147	23
	Chawkay	13	11			8	9	50	8	140	83	571	284	111
	Dangam								4	49		44	22	9
	Khas Kunar	75	82	10		12	50	173		70		298	41	18
	Marawara										345	170	22	33
	Narang		15	1		13	27	84	10	100	173	425	55	25
	Nari								1	-	60	0	19	0
	Nurgal	27	19	5		8	28	98	9	70	353	460	58	88
	Pech								11	263	310	585	76	183
	Sirkanay		25	2		34	54	71	8	100	141	385	50	75
Kunar Total		115	152	18	0	75	288	786	82	972	2,025	4,366	1,059	931
Province	District	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2,006
Kunduz	Ali Abad						5	51		3	5	41		0
	Archi											9		102
	Chahar Dara						8	30		6	15	37		0
	Imam Sahib						3					28		0
	Khan Abad						2	36			11	70		0
	Kunduz						9	51		3	9	32		0
	Qalay-l- Zal						11	321		5	8	7	275	0
Kunduz Total		0	0	0	0	0	38	489	0	16	49	224	275	102
Laghman	Alingar					2	71	131	3	146	354	593	107	259
	Alishing					3	26	88	0	104	148	597	69	192
	Dawlat Shah								12	-	571	233	44	118
	Mihtarlam					14	72	190		240	366	580	25	0
	Qarghayi					58	128	298	0	460	468	753	30	140
Laghman Total		0	0	0	0	77	297	707	15	950	1,907	2,756	274	709
Logar	Baraki Barak													0
	Charkh													0
	Khushi													0
	Muhammad Agha													0
	Puli Alam													0
Logar Total		0	0	0	0									
Nangarhar	Achin	5,354	2,187	2,315	1,640	1,693	2,209	1,317	1	940	2,131	1,907	198	1,274
	Bati Kot	3,797	529	392	1,013	2,034	603	535		2,390	1,994	4,683	166	550
	Chaparhar	1,089	1,377	1,750	1,234	1,365	977	832	2	990	1,169	1,818	20	209
	Dara-I-Nur	1,302	392	199	73	199	734	421		380	24	472	2	0

	Dih Bala	307	646	354	569	511	468	439	11	650	927	358	17	68
	Dur Baba	29	78	38	39	56	50	33		40	31	99	5	19
	Goshta	1,249	467	116	77	122	240	238	99	150	13	217	10	41
	Hisarak	202	453	253	370	436	741	541	2	620	1,016	1,392	64	283
	Jalal Abad	458	31	51	123	397	979	1,021		90	4	1,658	77	0
	Kama		18			198	389	589		1,120	558	1,898	82	0
	Khogyani	4,347	2,577	2,628	3,385	3,808	5,338	4,913	3	2,640	2,986	2,269	117	750
	Kuz Kunar	293	233	115	15	105	236	399		500	102	801	37	151
	Lal Pur	302	267	79	66	137	270	248	95	250	1	362	17	68
	Muhmand Dara	1,630		156	83	125	290	255		720	19	1,170	54	221
	Nazyan	343	138	251	111	252	184	177		150	98	168	8	160
	Pachir Wa Agam	768	571	681	400	488	731	630	3	420	1,142	1,091	35	143
	Rodat	1,026	2,038	1,959	1,583	2,147	3,649	2,302		2,760	3,313	3,633	50	0
	Sherzad	1,954	2,351	1,646	1,689	1,302	1,741	1,719	2	1,470	1,641	1,229	57	430
	Shinwar	3,884	1,265	2,075	1,478	1,374	1,559	1,300		2,060	1,616	1,759	79	504
	Surkh Rod	747	106	587	619	1,072	1,602	1,840	0	1,440	118	1,229	0	
Nangarhar Total		29,081	15,724	15,645	14,567	17,821	22,990	19,747	218	19,780	18,904	28,213	1,093	4,871
Nimroz	Chahar Burjak											65	526	1,119
	Chakhansur											0		0
	Kang	10	2	1	107	5	2					0		40
	Khash Rod	672	117	135	535	6	201	219			26	50	1164	661
	Zaranj													135
Nimroz Total		682	119	136	642	11	203	219	0	300	26	115	1,690	1,955
Nuristan	Bargi Matal											2	535	522
	Kamdesh										210	307	269	262
	Mandol											0	731	713
	Nuristan										438	185	19	19
	Wama											66		0
	Waygal											205		0
Nuristan Total											648	765	1,554	1,516
Province	District	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2,006
Paktika	Barmal													0
	Dila													0
	Gayan													0
	Gomal													0
	Mata Khan													0
	Nika													0
	Omna													0
	Sar Hawza													0
	Sarobi													0
	Sharan													0
	Urgun													0
	Waza Khwa													0
	Wor Mamay													0
	Zarghun Shahr													0
	Ziruk													0
Paktika Total		0	0	0	0	0	0	0						
Paktya	Azra					4	29	46	1	38	419	603		0
	Chamkani								0	-	76	275		0
	Dand Wa Patan											175		0

Takhar Total		0	0	0	0	0	201	647	211	788	380	762	1,364	2,179
Province	District	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2,006
Uruzgan	Chora	694	424	1,574	233	652	932	1,179	0	1,330	975	1,402	259	2,024
	Dihrawud	909	938	2,923	1,870	1,033	1,243	726	0	1,340	1,282	2,523	209	1,704
	Khas Uruzgan	0	4	0	0	0	0	130	0	-	580	358	338	886
	Nesh	410	334	104	399	373	510	394	0	490	59	426	352	614
	Shahidi Hassas	1,337	12	0	0	1,158	1,110	802	0	1,190	1,333	782	646	1,127
	Tirin Kot	1,428	1,180	3,271	2,484	1,445	1,194	1,494	0	750	469	1,874	221	3,348
Uruzgan Total		4,778	2,892	7,872	4,986	4,661	4,989	4,725	0	5,100	4,698	7,365	2,025	9,703
Wardak	Chaki Wardak										211	284		0
	Day Mirdad										0	90	106	0
	Hisa-i-Awali Bihsud										22	0		0
	Jalrez										531	78		0
	Markazi Bihsud										472	0		0
	Maydan Shahr										527	102		0
	Nirkh										780	215		0
	Sayd Abad										192	248		0
Wardak Total											2,735	1,017	106	0
Zabul	Arghandab	0	0	0	0	0	74	139	0		302	526	205	346
	Atghar										188	32	86	36
	Daychopan	0	0	0	0	0	41	114	0		646	431	1,016	742
	Mizan	54	0	255	154	160	373	383	0		309	251	56	123
	Qalat	0	0	0	0	1	46	40	0		689	317	188	657
	Shahjoy								0		178	679	240	538
	Shamulzayi										65	44	16	35
	Shinkay										164	287	102	228
	Tarnak wa Jaldak	0	0	0	0	0	77	48	1			410	145	506
Zabul Total		54	0	255	154	161	537	585	1	200	2,541	2,977	2,053	3,211
TOTAL		69,940	53,743	56,819	58,417	63,672	90,904	81,928	7,605	73,838	78,164	126,899	101,338	164,969
Rounded Total		70,000	54,000	57,000	58,000	64,000	91,000	82,000	8,000	74,000	78,000	131,000	104,000	165,000

Annex 3: Eradication verification estimates by district (hectares)

Province	District	Total Governors claims (ha)	Governor claim for surveyed villages (ha)	Area of eradication in surveyed villages (ha)	Estimated total eradication (ha)	Standing poppy in surveyed villages (ha)
Badakhshan	Argu	270	214	177	217	428
	Baharak	77	35	21	62	66
	Jurm	71	-	-	57	-
	Kishim	70	65	54	56	74
	Shahri Buzurg	100	-	-	80	-
	Total	589	314	252	473	
Badghis	Ghormach	12	12	5	5	38
	Jawand	262	230	80	91	27
	Murghab	302	204	33	78	306
	Qadis	845	845	429	429	7
	Total	1,421	1,291	547	602	
Baghlan	Baghlan	20	20	3	3	1
	Burka	56	6	0	5	0
	Dushi	3	3	0	0	0
	Nahrin	36	-	-	3	-
	Puli Khumri	24	24	2	2	0
	Tala wa Barfak	92	-	-	8	-
	Total	232	53	5	22	
Balkh	Balkh	1,299	1,263	542	696	381
	Chahar Bolak	662	462	305	358	507
	Chahar Kint	6	6	5	5	0
	Chimtal	1,374	803	634	725	1,606
	Dawlat Abad	388	383	167	209	111
	Dihdadi	34	34	14	18	4
	Kishindih	0	-	3	3	0
	Mazari Sharif	0	-	1	1	0
	Nahri Shahi	438	419	106	226	8
	Sholgara	112	90	79	79	1
	Shortipa	43	43	52	52	11
	Total	4,355	3,502	1,906	2,370	
	Day Kundi	Geti	10	9	6	7
Marmun		8	8	6	6	4
Nelay		7	7	7	7	2
Shahristan		6	6	3	4	0
Tamzan		5	4	5	5	1
Total	35	35	28	28		
Farah	Anar Dara	69	69	1	24	19
	Bakwa	504	486	200	200	540
	Balabuluk	49	36	36	36	273
	Farah	1	1	0	0	3
	Gulistan	26	10	9	11	132

	Khaki Safed	147	122	52	61	205
	Lash Wa Juwayn	10	-	-	4	-
	Pur Chaman	302	153	7	76	230
	Pusht Koh	15	-	-	6	-
	Pusht Rod	151	150	98	98	266
	Qalay-i-Kah	63	63	47	47	1
	Shib Koh	17	1	1	7	2
	Total	1,355	1,089	451	561	

Province	District	Total Governors claims (ha)	Governor claim for surveyed villages (ha)	Area of eradication in surveyed villages (ha)	Estimated total eradication (ha)
Faryab	Bilchiragh	84	84	40	40
	Daw lat Abad	7	7	7	7
	Khw aja Sabz	98	98	78	78
	Pashtun Kot	21	21	51	51
	Qaysar	151	151	78	78
	Shirin Tagab	19	19	11	11
	Total	381	381	264	264
Hilmand	Deshu	1,404	828	280	600
	Garmser	2,107	1,089	543	900
	Greshk	2,607	1,133	537	1,114
	Khanashen	1,291	419	122	552
	Total	7,409	3,469	1,482	3,165
Hirat	Adraskan	29	11	9	9
	Ghoryan	53	42	28	28
	Guzara	4	2	3	3
	Injil	0	-	2	2
	Kushk Kuhna	7	3	1	3
	Kushk Rubat	89	85	12	30
	Obe	1	1	1	1
	Shindand	69	11	4	22
	Zinda Jan	29	29	15	15
	Total	280	184	74	113
Jaw zjan	Aqcha	15	15	2	4
	Darzab	14	5	1	3
	Fayzabad	100	85	20	21
	Khanaqa	13	9	7	7
	Mardyan	11	9	3	3
	Mingajik	3	3	2	2
	Qush Tepa	4	4	0	1
	Shibirghan	40	40	6	7
Total	202	170	40	48	
Kandahar	Arghandab	836	620	479	554
	Argghanistan	0	-	45	45
	Daman	407	184	111	271
	Kandarhar	603	394	336	424
	Maywand	420	259	210	277
	Panjwayi	183	27	18	129
	Shah Wali Kot	175	129	39	123
	Spin Boldak	578	288	87	373
	Takhta Pul	0	-	92	92
	Zaray	819	772	463	542
	Total	4,020	2,672	1,880	2,827
Kunar	Asad Abad	10	4	2	3
	Bar Kunar	18	4	1	5
	Dangam	37	9	0	11
	Ghazi Abad	9	5	1	3
	Marawara	6	6	1	2
	Narang	1	-	-	0
	Nari	8	-	-	3
	Shegal	11	11	8	8
	Sirkanay	4	-	-	1
	Wata Pur	25	-	-	7
Total	129	38	13	44	



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